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OFFICERS OF THE INSTITUTION,
MEMBERS AND ASSOCIATES,
BALANCE SHEET, ANNUAL REPORT,
AND
METEOROLOGICAL REPORT AND REGISTER.

1889-90.

OFFICERS OF THE INSTITUTION.

SESSION 1889-90.

President :

REV. PROF. CHAPMAN, LL.D.

Vice-Presidents :

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Botany—MR. D. D. DOBELL. *Mineralogy*—DR. R. OXLAND, F.C.S.

Geology and Petrology—MR. R. N. WORTH, F.G.S.



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LIST OF MEMBERS.

HONORARY MEMBERS.

Elected.	Name.	Address.
1865	Adams, J. C., D.C.L., F.R.A.S.	The Observatory, Cambridge.
1887	Dallinger, Rev. W. H., LL.D., F.R.S., etc.,	Wesley College, Sheffield.
1874	Froude, James Anthony, M.A.	5, Onslow Gardens, London, W.
1859	Gibbs, F. W., Q.C., C.B., 24, Mount Street,	Grosvenor Square, London, W.
1877	Günther, Dr. A., F.R.S., F.L.S., F.Z.S.	British Museum, London.
1887	Lankester, Ray, Professor, F.R.S.	North Bank, London, N.W.
1865	Lubbock, Sir John, Bart., D.C.L., F.R.S., F.L.S.,	High Elms, Kent.
1874	Pengelly, W., F.R.S., F.G.S.	Lamorna, Torquay.
1859	Scrivener, Rev. F. H. A., M.A., LL.D.	Hendon, Middlesex.
1875	Temple, Right Rev. Dr., Bishop of London,	The Palace, Fulham.
1865	Vivian, Edward, M.A.	Torquay.
1872	Weymouth, R. F., D.LIT.	33, Alfred Road, Acton, London.
1872	Worth, R. N., F.G.S.	4, Seaton Road.

LIFE MEMBERS.

1855	Alger, J.	Sydney, Australia.
1863	Alger, W. H.	Manor House, Stoke.
1856	Bartlett, G.	Plymouth.

CORRESPONDING MEMBERS.

1887	Iago, Rev. W., B.A.	Bodmin.
1858	Ormerod, G. W., M.A., F.G.S.	Woodway, Teignmouth.
1863	Vicary, W., F.G.S.	Exeter.

LECTURING MEMBERS.

1868	Adams, W.	Frankfort Street.
1881	Aldridge, Charles, M.D.	Plympton House, Plympton.
1860	Anthony, Rev. F. E., M.A.	13, Woodland Terrace.
1884	Babb, H. R.	21, Portland Square.
1864	Balkwill, Francis Hancock	Princess Square.
1889	Bayly, Robert	Torr Grove, near Plymouth.
1826	Bennett, J. N.	Windsor Villas.
1884	Bignell, George C., F.E.S.	7, Clarence Place, Stonehouse.
1888	Binns, Rev. W.	1, Caer Baden Terrace, Plymouth.
1888	Bourne, Gilbert C., M.A., F.L.S.	Marine Biological Laboratory.
1861	Brent, Francis, F.S.A.	6, Tothill Avenue.
1885	Brenton, W. H.	Cobourg Street.
1862	Briggs, Thomas Richard Archer, F.L.S.	Fursdon, near Plymouth.
1881	Burnard, Charles F.	Chatsworth Lodge, Compton Park Road.
1886	Burnard, Robert	3, Hillsborough, Mannamoad.
1851	Cater, Samuel	North Devon Place.
1876	Chapman, Rev. C., LL.D., M.A.	Western College, Tavistock Road.

LECTURING MEMBERS—*continued.*

Elected.	Name.	Address.
1880	Clarke, Sir Edward, Q.C., M.P.,	Huntingdon Lodge, Peckham-rd., London.
1851	Collier, W. F.	Woodtown, Horrabridge.
1876	Collier, Miss Bertha Cycill	Woodtown, Horrabridge.
1876	Collier, Charles Calmady	Brook, Horrabridge.
1884	Collier, G. B., M.A.	Woodtown, Horrabridge.
1889	Colson, F. H., M.A.	Plymouth College.
1888	Cunningham, J. T., B.A., F.R.S.E.	Marine Biological Laboratory.
1889	Davis, Orlando J. H.	5, Tothill Avenue.
1882	Debnam, Alfred R.	Mount Pleasant, Plymouth.
1884	Dickson, Rev. W., LL.D.	53, Haddington Road, Stoke.
1884	Dobell, Douglas D.	1, Auburn Place, Plymouth.
1880	Edmonds, Robert G.	Mount Drake.
1882	Evans, H. Montague	4, South Devon Place.
1874	Fouracre, John T.	Chapel Street, Stonehouse.
1875	Fox, Francis E., B.A., F.R.G.S.	Uplands, Tamerton Foliot.
1868	Fox, R. R.	Westbrook, Tamerton.
1889	Goard, Thomas	2, Portland Square.
1851	Harper, T., M.R.C.S.	7, Tothill Avenue.
1886	Harvey, T. H.	Cattedown.
1852	Hine, James, F.R.I.B.A.	Mulgrave Place.
1867	Hingston, C. Albert, M.D.	Sussex Terrace.
1889	Hodge, Rev. J. M.	Tavistock Place, Plymouth.
1875	Hughes, R. H., M.A., M.B., M.R.C.S.	12, Lockyer Street.
1876	Inglis, James C., C.E.	3, Buckland Terrace.
1881	Inskip, Capt. G., R.N., F.R.G.S.	Torrington House, North Road.
1868	Jackson, George, F.R.C.S.	10, Portland Villas.
1851	Jago, George	Halwell House, Halwell Street.
1882	Jago, C. S., F.R.G.S.	Cobourg Street.
1889	Laphorn, W. G.	Eaton Terrace.
1883	Matthews, Coryndon, F.E.S.	Erme Wood, Ivybridge, S. Devon.
1874	Merrifield, John, LL.D., F.R.A.S., F.R.M.S.	7, Hobart Terrace.
1862	Mitchell, Philip, R.I.	Bedford Terrace.
1867	Monkswell, The Right Hon. Lord	7, Chelsea Embankment, London.
1870	Morley, The Right Hon. the Earl of	Saltram, Plymouth.
1861	Mount Edgcumbe, The Right Hon. the Earl of	Mount Edgcumbe.
1889	Murray, Robert	13, Windsor Terrace.
1884	Norman, John G.	2, Sea View Terrace.
1851	Oxland, R., PH.D., F.G.S.	Portland Square.
1871	Pearse, W. H., M.D.	1, Alfred Place.
1889	Penrose, Richard A.	74, Durnford Street, Stonehouse.
1886	Phillips, Frank, F.R.C.I.	7, West Hoe Terrace.
1883	Prance, H. Penrose.	7, Athenæum Terrace.
1859	Prowse, A. P.	Yannadon, Horrabridge.
1884	Radford, Charles H.	37, Bedford Street.
1880	Rew, G. Gale	3, Whitefield Terrace.
1875	Rider, A., F.C.S.	4, Haddington Road, Stoke.
1888	Ridge, B. J.	3, Gainsborough Place, Mutley.
1857	Risk, Rev. J. Erskine, M.A.	Princess Square.
1861	Rowe, J. Brooking, F.S.A., F.L.S.	Plympton.

LECTURING MEMBERS—*continued*.

Elected.	Name.	Address.
1886	Sexton, Louis	Portland Square.
1860	Shelly, John	Princess Square.
1867	Slater, D., M.A. . . .	Cheveley Hall, Seymour Road.
1886	Slater, Gilbert, B.A. . .	Cheveley Hall, Seymour Road.
1875	Smith, Robert	George Street.
1869	Square, W., F.R.C.S., F.R.G.S..	Portland Square.
1884	Square, J. Elliott, F.R.C.S. .	Portland Square.
1865	Tweedy, W. Gage, B.A. . .	Athenæum Terrace.
1884	Vincent, Rev. Samuel . . .	6, Woodland Terrace.
1885	Wade, William Cecil . . .	5, Portland Square.
1883	Watson, G. F.	14, Smeaton Terrace.
1875	Webb, F. J., F.G.S. . . .	Plymleigh, Aigburth, near Liverpool.
1888	Weldon, W. F. R.	Marine Biological Laboratory.
1887	Wilson, W. C., M.B. . . .	St. Aubyn Street, Devonport.
1888	Wood, Carslake W.	Hareston, The Crescent, Plymouth.
1888	Wood, J. Winter	Hareston, The Crescent, Plymouth.
1889	Woodhouse, H. B. S. . . .	10, Portland Square.
1873	Woolcombe, R. W., Surgeon-Major	St. Jean d'Acre Terrace, Stoke.
1889	Woolcombe, J. Y.	Princess Square.
1879	Worth, R. N., F.G.S. . . .	4, Seaton Road, Mutley.
1889	Worth, R. Hansford, C.E. .	4, Seaton Road, Mutley.
1878	Wright, W. H. K., F.R.H.S. .	31, Headlands Park.

"The property of the Institution, the election of members, management of the concerns, and enactment of laws, are vested exclusively in the Lecturing Members."—LAW 5.

ASSOCIATES.

Allen, Mrs. E. R., 11, Coryton Terrace.	Cooper, Cornelius Francis, 17, East Street.
Attwood, J. S., Old Town Street.	Crowther, J. B., Bryn Tirion, Seymour Road, Mannamead.
Back, Josias, 6, Headland Park.	Cuming, C. H., F.R.C.S., Sussex Street.
Barrett, G. R., Bank of England Place.	Darton, William, Mount Batten.
Barrett, J., 4, Seymour Terrace.	Derry, W., Houndiscombe House.
Barron, J., 16, Townsend Crescent, Compton Gifford.	Deutsch, Herr, 3, Hoe Park Place.
Bayly, John, Seven Trees.	Diment, Thomas, 8, Brunswick Terrace.
Beechey, Admiral, 13, St. James's Terrace.	Dingle, Thomas, sen., 2, Channel View, Lipson Road.
Berry, J. P., 2, Walker Terrace.	Foale, William, jun., 3, Meadsfoot Terrace, Mannamead.
Brendon, W. Turner, George Street.	Foster, J. B., 4, Cambridge Street.
Brown, J. P., The Abbey, Plymouth.	Greenlaw, Wm., 3, Glenside, Manna-mead.
Browning, F., Compton House, Compton.	Harris, Henry Vigers, Union Street.
Bulteel, Thomas, Radford, Plymouth.	Hawken, George, The Cornish Bank, George Street.
Butler, Theobald, M.A., Wellington Villa, Mannamead.	Hearder, H. P., Westwell Street.
Chalker, John P., 9, Crescent Place.	Heath, William, George Street.
Clark, W., 19, Portland Villas.	Hill, F. N., 9, South Devon Place.
Clark, Richard, 43, Torrington Place.	Honey, Augustine, Bank Street Chambers.
Coath, Walter, Somerville, Thorn Park.	
Cole, A., Bedford Terrace.	
Collins, George, 4, Windsor Terrace.	
Compton, C.E., 5, St. James's Terrace.	
Coode, T. Lyne, 42, George Street.	

ASSOCIATES—*continued.*

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| <p>Hoskin, R., Ebrington Street, Plymouth.
 Hubbard, G., J.P., Ford Park.
 Jago-Trelawny, Major-General, Col-drenick, Cornwall.
 James, Capt. R. W., 4, Alfred Place.
 James, C. H., Ingleside, Mannamead.
 James, Edward, J.P., Greenbank.
 James, W. Collier, Hillsborough, Mannamead.
 Jenkins, Sir James, K.C.B., R.N., Nevingstone, Seymour Road, Compton Gifford.
 Kerswell, Alfred J., Ham Street.
 Kerswell, Samuel, 1, Osborne Place.
 Kerswill, F. J., Frankfort Street.
 King, William, Hoe House.
 Lampen, Major-General J., 6, Alton Terrace.
 Lane, F. Cecil, 1, George Street.
 Latimer, Alfred, Portland Square.
 Lemann, Fred. C., Blackfriars House.
 Lemon, Rev. Dr. T. W., D.D., 1, Cheltenham Place.
 Lester, R. E., 13, Whitefield Terrace.
 Lovibond, J., H.M. Customs, Parade.
 Mabin, Francis, 10, Union Street.
 Martin, W., Windsor Villas.
 MacAndrew, J., F.L.S., J.P., Lukesland, Ivybridge.
 Mayne, T., 4, Victoria Place, Stonehouse.
 Mitchell, T., Eton Villas.
 Morrish, F. A., 2, Bedford Terrace.
 Morris, Charles, Gascoyne House.
 Mugford, James A., 5, Leigham Villas.
 Nash, J. O., 3, Seymour Terrace.
 Nicoll, G. B., 19, South Devon Place.
 Norbury, Dr. H. F., R.N., C.B., Royal Naval Hospital.
 Page, James A., 10, Windsor Terrace.
 Pagen, J. Fletcher, F.G.S., Pendower, Mannamead.</p> | <p>Pearse, T., M.D., Flora Place.
 Penson, James, 7, Boon's Place.
 Philips, G., 1, Victoria Place, Stonehouse.
 Phillips, Louis B., 4, Alton Terrace.
 Pode, J. Duke, J.P., Slade Hall, Ivybridge.
 Radford, John, Bedford Street.
 Randle, J., Union Street.
 Revelstoke, Lord, Membland.
 Rhodes, Rev. Charles, 2, Compton Park Villas.
 Rodd, R. R., jun., 63, Union Street, Stonehouse.
 Rooke, Samuel, 5, Westbury Terrace.
 Rorie, John, M.D., Ford Park.
 Roy, David, 6, Holyrood Place.
 Serpell, E. W., 19, Hill Park Crescent.
 Smith, E. S., Old Town Street.
 Stephenson, G., Old Town Street.
 Stephenson, R., National and Provincial Bank of England, Devonport.
 St. Germans, The Right Hon. the Earl of, St. Germans, Cornwall.
 Taylor, Frank, 37, Flora Street.
 Taylor, J., 37, Flora Street.
 Taylor, Sydney, 37, Flora Street.
 Thomson, E. B., M.D., Norbiton House, North Road.
 Underhay, Mrs. H., Marlborough Road.
 Wills, J. C., 68, Durnford Street, Stonehouse.
 Willoughby, Joseph, Stafford Terrace.
 Willoughby, William, 5, Caprera Terrace.
 Wilson, J. Walter, 10, Leigham Villas.
 Windeatt, John, Woodland House.
 Wing, F. W., Restormel Terrace.
 Yerbury, Major J. W., Mount Wise, Devonport.</p> |
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LADY ASSOCIATES.

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| <p>Bond, Miss Rosa A., Highfield, Hartley.
 Borland, Mrs. R., Emma Place, Stonehouse.
 Cann, Miss Agnes, 20, Tavistock Road.
 Cooper, Miss Agnes G., 12, Cheltenham, Place.</p> | <p>Creagh, Mrs. H. W., 4, Victoria Place, Stonehouse.
 Gidley, Miss, 2, St. Michael's Terrace.
 Keen, Miss, 1, St. James's Terrace.
 Keen, Miss E., 1, St. James's Terrace.
 Minhinnick, Miss E. M., Portland Square.</p> |
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JUNIOR ASSOCIATE.

- P. A. Anthony, 13, Woodland Terrace.

REPORT

PRESENTED AT THE ANNUAL MEETING OF MEMBERS,

3RD APRIL, 1890.

THE Secretaries have pleasure in submitting a satisfactory Report of the working of the Plymouth Institution and Devon and Cornwall Natural History Society for the past year.

The Session just brought to a close compares favourably with former years in more than one respect, while the lists presented a series of Lectures on the most interesting and varied subjects, as the programme subjoined shows.

1889.

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| Oct. 3. | Conversazione. | |
| „ 10. | President's Address. | |
| „ 17. | Monuments and Monumental
Art of the Ancient Egyptians | MR. ROBERT MURRAY. |
| „ 24. | The Rise of English Engraving | MR. R. BURNARD. |
| „ 31. | Some of our Plymouth Sea-
weeds | MR. G. C. BIGNELL, F.E.S. |
| Nov. 7. | The Formation of Local Varieties
of a Species | MR. W. F. R. WELDON, M.A. |
| „ 14. | Land Transfer | MR. J. Y. WOOLLCOMBE. |
| „ 21. | Plymouth's Position in the
History of the World | REV. W. S. LACH SZYRMA, M.A. |
| „ 28. | Woman Suffrage | REV. PROF. ANTHONY, M.A. |
| Dec. 5. | Bi-metallism | MR. C. F. BURNARD. |
| „ 12. | On the Flight of Birds | MR. F. H. BALKWILL. |
| „ 19. | The Moorland Plym | MR. R. HANSFORD WORTH, C.E. |

1890.

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| Jan. 2. | Conversazione. | |
| „ 9. | Educational Theories in France
in the Eighteenth Century | MISS A. J. COOPER. |
| „ 16. | Institutions by Growth and by
Creation | MR. D. D. DOBELL. |
| „ 23. | Social and Moral Condition of
Rome in the First Century | MR. F. H. COLSON, M.A. |
| „ 30. | Charity and Charities | MR. R. N. WORTH, F.G.S. |

Feb. 6.	The Oyster	MR. BOURNE, M.A., F.L.S.
,, 13.	Localism <i>versus</i> Centralism .	REV. J. ERSKINE RISK, M.A.
,, 20.	For a Verdict against Capital Punishment	MR. W. SQUARE, F.R.C.S., F.R.G.S.
,, 27.	Art Culture <i>versus</i> Technical Schools	MR. JOHN PHILLIPS.
Mar. 6.	Some Extinct Cornish Families .	MR. W. C. WADE.
,, 13.	Discussion on Colonial Federation.	
,, 20.	Practical Aspect of Marine Zool- ogy	MR. J. T. CUNNINGHAM, B.A., F.R.S.E.
,, 27.	Water.—IV.	MR. A. R. DEBNAM.

The features in this list, which may be noted when comparing it with former years, are the extended use of the Lime-light and Photography for illustration, and the valuable lectures on Biological subjects contributed by the resident members of the Marine Biological Association.

It is satisfactory also to notice that in the Session just closed no fewer than four Lecturers made their first appearance at the Plymouth Institution.

Although the above features in the Lecture List are encouraging signs, and all the various operations of the Society have been carried on with vigour, the Secretaries venture again to impress on the members the desirability of widening the circle of membership.

In several respects the usefulness of the Institution is curtailed for want of funds.

A new departure has been made this year in letting the Lecture Room, and otherwise providing suitable accommodation, for the Devon and Cornwall Camera Club and the Graphic Society. These Societies use the rooms of the Plymouth Institution for their meetings, and already have assisted the Institution by arranging an Exhibition of Photographs and Apparatus, the work and property of members.

The Secretaries trust the policy of affiliating other cognate Societies with the Plymouth Institution will be developed, and are confident such mutual support will result in benefit to all interested.

The number of Lecturing Members keeps well up, but a slight falling off has to be recorded in the Associates. At present there are 106 Honorary, Life, Corresponding, and Lecturing Members; 101 Associates, 9 Lady Associates, and 1 Junior Associate.

The Treasurer's Report shows that the funds of the Society are only just sufficient to meet the normal expenditure, and that too after exercising great economy ; so that the debt, which now amounts to £316 14s. 4d., remains an unsatisfactory burden on the Society, while no provision is made for meeting extraordinary expenditure, such as the thorough repair of the exterior of the building, which must from time to time be made for maintenance and necessary improvements.

An attempt was made last year to consider if any and what steps could be taken to raise a sum for the reduction of the debt, but no decision was arrived at. The same necessity at present exists.

The Library has, as usual, received considerable and valuable additions from friends, full particulars of which will be found in the Report of the Librarian.

No changes of any note have been made in the Art Gallery and Museum.

The Secretaries, in accordance with the instructions of the last Annual Meeting and of the Council, ascertained from the Director of the National Gallery that, after insuring the Turner pictures for the specified sum against fire, and taking reasonable precautions for their safety in other respects, no further responsibility remains on the members. These pictures have consequently been retained in the Art Gallery.

The Anniversary Meeting was held on Monday, May 1st, when short papers were read by Dr. Merrifield, F.R.A.S., on "An Artificial Horizon;" and Mr. J. T. Cunningham, B.A., F.R.S.E., on "The Environment of Fishes," and were discussed by the members.

Each half of the Lecture Session was, as usual, opened by a *Conversazione*. At the first the pictures in the Exhibition of the Plymouth Art Club were a great attraction; while Mrs. W. Adams and Mr. W. Square contributed songs at intervals.

At the second the Devon and Cornwall Camera Club and the Graphic Society kindly arranged an Exhibition of Photographs and Drawings by members, which proved of exceptional interest. Music was also kindly provided by Mrs. Hughes, Miss Grace Pinwell, Miss Risk, Miss Dawe, and Mr. W. H. K. Wright.

The Annual Excursion was made on July 1st, to Dartmeet. Carriages were obtained at the "Duchy," and, passing Two Bridges and Crockern Tor, a halt was made at Dunnabridge Pound, to view the so-called Judge's Chair. Dartmeet was reached a little

after noon, where the members dispersed in various parties, exploring and enjoying the beauties of this famed locality, on this occasion enhanced by perfect weather; and a return was made to the Duchy Hotel, Princetown, for the usual high tea.

There have been no short excursions during the past year.

The Report of the Librarian, above referred to, is as follows :

The Librarian has little to report beyond the addition of many volumes to the property of the Institution. The following have been presented :

Report of the British Association for 1888. By the Association.

Proceedings of the Berwickshire Naturalists' Club. Vol. X., Part III. Vol. XII., Parts I. and II. By the Club.

Report of the Manchester Scientific Students' Association for 1888. By the Association.

Transactions of the Meriden Scientific Association. By the Association.

Annals of the Teignbridge Cricket Club. 1823-83. By the Author, G. W. Ormerod.

Journal of the Marine Biological Association. Nos. 2 and 3. By the Association.

Transactions of the Norfolk and Norwich Natural History Society for 1885-88, and Supplement. By the Society.

Atti della Societa Toscana. Memoirs, Vol. X. Processi Verballi, Vols. VI. and VII. By the Society.

Report of the Belfast Naturalists' Field Club. Vol. III., Parts I. and II. By the Club.

Twelfth Report of the Plymouth Free Library, 1889. By the Committee.

Index to Minerals in Derby Public Museum. By the Author, H. Arnold Bemrose.

Report of the Royal Cornwall Polytechnic Society for 1889. By the Society.

Proceedings of the Somersetshire Archæological and Natural History Society for 1888. By the Society.

Journal and Proceedings of the Royal Society, New South Wales. Vol. XXII., Part II.; and Vol. XXIII., Part I. By the Society.

Transactions of New York Academy of Sciences. Vol. VIII., Parts I. to VIII. By the Academy.

- Scientific Proceedings of the Royal Dublin Society. Vol. VI., Parts III. to VI. By the Society.
- Scientific Transactions of the Royal Dublin Society. Vol. IV. By the Society.
- Report and Transactions of the Penzance Natural History and Antiquarian Society for 1888-89. By the Society.
- Proceedings of the Bristol Naturalists' Society. New Series. Vol. VI., Part I. By the Society.
- Transactions of the Manchester Microscopical Society. By the Society.
- Smithsonian Institution Report for 1886. Part I. By the Institution.
- Transactions and Proceedings of the Botanical Society of Edinburgh. Vol. XVII., Parts II. and III. By the Society.
- Transactions of the Essex Field Club. Vol. III., Nos. 1-9. By the Club.
- Prodromus of the Zoology of Victoria. Decades 18 and 19. By the Premier of Victoria.
- Mémoires du Comité Géologique. Vols. III. and VIII. Supplement ditto. Bulletins ditto. By the Society.
- Report of the Australian Museum for 1888. By the Trustees.
- Report of the Devonshire Association for 1889. By the Association.
- Devonshire Domesday. Part VI. By the Devonshire Association.
- Journal of the Royal Institution of Cornwall. Vol. IX., Part IV. By the Institution.
- A Collection of Tracts. By the Author, R. N. Worth.
- Contributions to Canadian Palæontology. Vol. I., Part II. By the Geological and Natural History Survey of Canada.
- Proceedings of the Geologists' Association. Vol. II. By the Association.
- Transactions of the Northumberland, Durham, and Newcastle-on-Tyne Natural History Society. Vol. VIII., Part III. By the Society.
- Journal of the British and American Archæological Society of Rome for 1888-89. By the Society.
- Tourists' Guide to Worcestershire. By the Author, R. N. Worth.
- Publications of the Dartmoor Preservation Association. Vol. I. By J. Brooking Rowe.

- Transactions of the Berwickshire Naturalists' Club for 1888. By the Club.
- United States' Geological Survey Monographs (13 and 14) and Atlas, and Bulletins. By the Survey.
- Hymenoptera: Group Braconides. By the Author, Rev. T. A. Marshall.
- Monograph of British Braconidæ. Parts I. to III. By the Author, Rev. T. A. Marshall.
- The English Sparrow in North America, by Walter H. Barrows. By the Department of Agriculture, N.S.A.
- North American Fauna, by Dr. C. Hart Merriam. Vols. I. and II. By the Department of Agriculture, N.S.A.
- Human Bones in a Scrobicularia Bed. By the Author, W. Pengelly.
- Catalogue of Scientific Books in the Library Society of New South Wales. Part I. By the Society.
- Proceedings of the Literary and Scientific Society of Liverpool. Vols. XLI. to XLIII. By the Society.
- Annual Report of the Geological and Natural History Survey of Canada. Vol. III., Parts I. and II. Maps to accompany ditto. By the Survey.
- Journal of the Royal Microscopical Society. By the Society.
- Proceedings of the Zoological Society. By the Society.
- Quarterly Journal of the Geological Society. By the Society.
- Proceedings of the Royal Society. By the Society.
- Proceedings of the Geologists' Association. By the Association.
- Proceedings of the Royal Geographical Society. By W. Square.

The following works have been purchased :

- Challenger Reports. 4 vols.
- Folk Lore Society Publications. 1889.
- Early English Text Society's Publications. 1889.
- Catalogue of British Fossil Vertebrata. By A. S. Woodward and C. D. Sherborn.
- The Blue Friars: their Sayings and Doings. By W. H. K. Wright. Ray Society Publications. 1889.
- Palæontographical Society Publications. 1889.
- Zoological Record. 1888.
- Coleoptera of the British Islands. By Rev. J. E. Fowler.

The following serials have been continued :

Nature.	Western Antiquary.
The Entomologist.	Folk Lore Journal.
The Zoologist.	Ibis.
Philosophical Magazine.	Mind.
Annals and Magazine of Natural History.	Grevillea.
Geological Magazine.	Quarterly Journal of Microscopical Science.
Journal of Botany.	Journal of Anatomy and Physiology.
American Journal of Science.	Annales des Sciences Naturelles:
Entomologists' Monthly Magazine.	Zoologie.

The books are for the most part in good order, although, if funds allowed, some would be better for binding.

More shelf-room is greatly needed, but it is difficult to make any suggestion as to providing it. The time will soon come when the Society will have to arrange for the enlargement of the Library.

J. C. INGLIS,
H. PENROSE PRANCE, } *Secretaries.*

BALANCE SHEET

OF

The Plymouth Institution and Devon and Cornwall Natural History Society,

FOR THE YEAR ENDING 1ST APRIL, 1890.

	1889 £	s.	d.		1889 £	s.	d.			
Annual Subscriptions	.	189	15	9	Balance	.	348	19	8	
Arrears of	.	7	7	0	Lighting and Warming—Gas	.	10	13	10	
Rent of Hall	.	21	2	6	"	.	2	5	6	
" Western Counties Telephone Co.	.	0	1	0	Repairs, &c.	.	0	7	6	
Plymouth Art Club—Gas and Fires	.				Taxes, Insurance, and Water	.	9	14	3	
Returned Subscription <i>Zoological Record</i>	.	0	10	0	Museum and Art Gallery	.	2	7	4	
Sale of Transactions	.	1	1	6	Library—Books, &c.	.	39	4	4	
Birds	.				" Binding	.	7	17	0	
Admissions to Museum	.	1	15	0	Reports	.	37	17	6	
Secretary—Balance Annual Excursion	.				Stationery, Printing, &c.	.	5	0	0	
Balance	.	316	14	4	Advertising	.	1	16	0	
					Conversazioni	.	6	3	11	
					Salary and Commission	.	24	18	3	
					Petty Disbursements	.	18	11	11	
					Postages	.	3	0	10	
					Excursion	.	2	0	6	
					Interest	.	17	8	9	
							<u>£538</u>	<u>7</u>	<u>1</u>	
					Balance	.	.	316	14	4
							<u>£538</u>	<u>7</u>	<u>1</u>	
										349

We have examined the foregoing accounts and balance sheet, and compared the same with the vouchers, and find the same correct.

SAMUEL CATER, } *Treasurers.*
R. N. WORTH, }

LOUIS E. SEXTON, } *Auditors.*
GEORGE H. INSKIP, }

April 1st, 1890.

METEOROLOGICAL REPORT.

SUNSHINE IN PLYMOUTH FOR 1889.

MONTH.	Sun above the horizon hrs. min.		Sun shone in Plymouth hrs. min.		Percentage actual was of possible.	No. of days no sun- shine.
January	260	19	...	52 17	...	20·1 ... 14
February	277	28	...	77 34	...	28·0 ... 9
March	364	17	...	104 58	...	28·8 ... 7
April	409	30	...	160 34	...	39·2 ... 1
May	473	49	...	171 30	...	36·2 ... 6
June	484	12	...	207 54	...	42·9 ... 3
July	486	47	...	187 21	...	38·5 ... 3
August	441	48	...	178 57	...	40·5 ... 1
September	372	49	...	139 33	...	37·5 ... 2
October	326	17	...	87 21	...	26·7 ... 5
November	264	8	...	33 33	...	12·7 ... 14
December	244	14	...	55 51	...	22·2 ... 13

SUNSHINE.—The sunshine for the year was 33 per cent. of that possible. The sun shone in Plymouth rather less than one-third of the time he was above the horizon, while on 78 days he was not visible here. The sunshine for the year was less than the average.

RAINFALL.—Rain fell on 184 days, to the amount of $34\frac{1}{2}$ inches, which is about 97 per cent. of the average. The heaviest rainfall for the year in twenty-four hours was 1·13 inches, on February 6th. For seven months of the year the rainfall was below the average, June having been a very dry month. The wettest months were March and October; more than 5 inches fell in each month. On four days more than an inch fell in twenty-four hours. On March 20th, in a shower lasting four and a half minutes, there fell ·15 inch. The longest dry period was from November 5th to 17th, and the longest wet period was from September 29th to November 4th, in which we get thirty-six days with only seven days during which no rain was measured. In seven days, from March 3rd to 9th, there fell 4·15 inches of rain. In October there were only seven dry days.

WET MONTHS.—March, May, July, August, and October.

DRY MONTHS.—January, February, April, June, September, November, and December.

BAROMETRIC PRESSURE.—The greatest atmospheric pressure for the year was on January 3rd, when it was 30·713 inches; the least pressure was 28·982 inches, on March 20th. Thus the greatest range was 1·751 inches, but the average range was 1·079 inches.

TEMPERATURE.—The temperature for the year was 50·68 degrees F., or about the mean for 25 years. The highest temperature in the screen was 81 degrees F., on June 6th; the lowest was 24 degrees F., on February 28th. The annual range was therefore 57 degrees F. in the screen. The hottest in the sun was 136 degrees F., on June 5th and 29th; and the coldest on the grass was 23·8 degrees F., on March 1st, giving as the maximum annual range 112·2 degrees F.

HOT MONTHS.—May, June, and November.

COLD MONTHS.—January, February, March, April, July, August, September, October, and December. Thus the supply of fruit was again small.

WINDS.—These were chiefly from the eastward, and, as a result, the West of England was colder and drier than the mean.

GALES have been few and light; thus few casualties around the western shores have occurred.

SNOW fell on seven days; viz., twice in February, three times in March, and twice in November.

HAIL was experienced on March 20th and on October 12th very heavily.

THUNDERSTORMS were very few, and occurred on March 20th, May 23rd, and October 12th.

J. MERRIFIELD.

An ABSTRACT from the METEOROLOGICAL REGISTER, from 1st January, 1889, to 31st December, 1889, kept at No. 7, Hobart Terrace, Lipson Road, Plymouth (Lat. $50^{\circ} 22\frac{1}{2}'$ N., Long. $4^{\circ} 7'$ W.), by JOHN MERRIFIELD, LL.D., F.R.A.S., F.R.M.S.

MONTH.	BAROMETRICAL PRESSURE REDUCED TO MEAN SEA LEVEL AT 32° FAH.			TEMPERATURE.			HYGROMETER.				RAINFALL.		DIRECTION OF WIND AT 9 A.M.				
	Average Barometer for Month.	Maximum Barometer for Month.	Minimum Barometer for Month.	Average Maximum in shade.	Average Minimum.	Average temperature.	Average dry Bulb.	Average wet Bulb.	Average dew Point.	Average humidity, saturation, 100.	No. of days on which not less than 0.1 in. fell	Quantity for the month in inches.	From N. by E. to E.	From E. by S. to S.	From S. by W. to W.	From W. by N. to N.	Calm.
1889																	
January .	30.204	30.713	29.414	45.95	36.76	41.36	40.70	39.67	38.33	92	14	1.74	9	9	2	6	5
February .	30.025	30.528	29.485	46.13	35.51	40.82	40.17	38.55	36.44	87	16	2.57	6	0	7	15	0
March .	30.033	30.566	29.982	47.06	36.55	41.81	41.77	40.25	38.35	88	15	4.96	10	7	5	4	5
April .	29.759	30.283	29.271	54.21	41.41	47.81	47.65	44.98	42.05	81	15	1.66	6	8	4	11	1
May .	29.816	30.111	29.551	62.84	48.97	55.91	58.83	52.99	50.34	81	14	2.58	4	11	4	9	4
June .	30.036	30.382	29.683	70.48	51.65	62.57	62.40	57.84	53.97	76	10	.91	13	11	1	2	3
July .	29.962	30.455	29.538	69.02	55.33	62.18	61.53	57.89	54.89	80	16	3.81	5	8	7	10	1
August .	29.923	30.307	29.457	67.16	53.61	60.39	60.42	57.77	55.57	84	21	3.42	0	7	7	14	3
September .	30.082	30.403	29.482	63.91	51.60	57.76	57.97	55.38	53.03	84	13	1.78	3	15	1	8	3
October .	29.989	30.142	29.035	55.15	43.51	49.33	48.40	47.05	45.56	92	24	5.27	9	5	3	9	5
November .	30.243	30.599	29.660	53.81	43.72	48.77	47.60	46.55	45.39	91	12	2.21	10	6	2	6	6
December .	30.170	30.634	29.537	45.59	33.39	39.49	40.75	39.68	38.29	90	15	3.25	9	9	9	2	5
Average for 1889	30.020	30.427	29.425	56.77	44.58	50.68	50.43	48.22	46.02	85.5	184	34.41	81	95	52	96	41
Average for 22 Years	29.953	30.404	29.325	57.83	44.83	51.33	50.41	48.47	46.59	86	186	36.	78.8	65.4	98.1	81.6	41.1

The observations are all made at nine a.m. The Rain Gauge is by Casella, and 8 inches in diameter; its top is 9 feet 2 inches above the ground, and 131.2 feet above the mean level of the sea. A rainy day is one in which not less than 1-100th of an inch falls. The instruments have all been supplied by the Meteorological Committee of the Royal Society, compared at Kew, and the index error applied to each.

TRANSACTIONS
OF THE
PLYMOUTH INSTITUTION
AND
Devon and Cornwall Natural History Society.

1889-90.

ADDRESS

AT THE OPENING OF THE SESSION 1889-90.

BY REV. PROFESSOR CHAPMAN, LL.D.,

President.

LADIES AND GENTLEMEN,—

Once more we are permitted by a kind Providence to meet together in this place, now becoming historic, to prosecute the purposes for which the Plymouth Institution exists. Some whose faces were in years past familiar, and who in one form or another rendered good service to the cause of Science, Literature, or Art, are no longer with us. Let the memory of every one who has ever contributed any item to the world's sum of truth, or inspiration, or enjoyment of the good and beautiful, be respectfully cherished by those of us who have yet to perform our part towards the intellectual and moral development of the race. The years roll on, the surface of the earth varies, actors on the stage of human life flit across the scene and vanish from view, and so "the old order changeth"; but men still live and crowd one on the other, intellects crave for light, conduct needs guidance and healthful stimulus, and the wide realms of external Nature and of Mind have yet to be more thoroughly explored in view of the coming time when, having interpreted Nature in obedience to her own ways, her secrets shall be more perfectly unlocked, and man become in reality, as he is now in word and promise, the crown of Nature, the inheritor and ruler of the riches of the earth and air and sky.

It is a feature of our times, very interesting and agreeable to all who are heartily concerned in the advancement of mankind in culture and happiness, that there exist around us ever-increasing

and varied means of affording instruction to young and old, and for creating and cherishing an interest in the higher departments of knowledge. It will not be for lack of opportunities if the more educated and aspiring of our population do not obtain wider views of truth, and become more fitted to fill their places as members of a community that knows how to blend the cultivation of the mind with an efficient discharge of the ordinary duties of life.

But amidst the varied agencies rising and flourishing around us for the extension of knowledge and the development of the mental powers, I think it may be truly said that the place and function of the Plymouth Institution are as necessary and useful as ever. It is certainly desirable that, apart from professional assemblies in which the sciences of medicine and of jurisprudence are discussed from a professional point of view, there should be still a Hall wherein men of every profession may meet for the consideration of scientific questions from a purely scientific point of view, and where original investigations in Science and in Literature may meet with encouragement. I trust that, in years to come, we who are pledged by our membership to do our best to promote Science, Literature, and Art, may be able to maintain that standard of tone and material in our lectures and discussions which alone can justify our continued existence as an Institution. Called, as I have been, by your suffrages once more to occupy the honourable position of President, I feel that I can best repay your kind consideration by doing all that lies within my power, during this session, and in future sessions also, to render our meetings more and more worthy ourselves, and more conducive to the high purpose for which we as an Institution exist.

It has been usual for your President, at the opening of the session, to deliver an address on some topic supposed to be of interest to the audience, and in some degree consonant with the scientific or literary character we are here expected to sustain. It has appeared to me that, among the many subjects which on reflection rose before my mind, it might be useful, and would certainly be in keeping with much of our current thought, if I ventured to devote the brief space at our disposal to a statement, partly historical and partly critical in the judicial sense, of a question which is very important, and which has excited, and is bound in the future to excite, much scientific and also popular interest; I mean the *Emergence of Life and Consciousness*. I

know full well, as doubtless many of you do, the extreme difficulty and delicacy of the subject, and I feel that one's reputation for prudence and discretion is somewhat at stake in venturing to touch, in this public form, a theme that has puzzled and perplexed some of the wisest and most gifted men of our age. But I must confess that difficulties always have a fascination for me; and perhaps there is as much selfish pleasure in endeavouring to handle a tough problem as there is regard for the interest and instruction of others. One thing I can say, and that is, the subject is not at all new to me. For many years I have made it a study, and, though not professing to be a Naturalist or an experimental expert, I hope I may say with all humility that I am familiar with the arguments of contending schools, and have tried to weigh them one against the other with the most rigid impartiality.

One remark is necessary before proceeding to the exposition; namely, that the question at issue is to be regarded as strictly scientific, except so far as Philosophy may come in to shed light on the pathway when the eye of Science is dim. I do not mean to say that Science or Philosophy, or both combined, can clear up all difficulties, and once for all completely solve the problem. Science, as yet, is only in its infancy; and Philosophy, though older, has not lived long enough to penetrate into all the hidden tracks of being and destiny. But what I mean is, that if ever we are to find out or know anything about the first appearance of Life and Consciousness in the world, apart from supernal information, it must be by following along lines of scientific research; and the question therefore is, What information does such research yield us? What conclusion does it lay before us that we may regard as satisfactory? Or, if Science is unable, in consequence of the extreme difficulty of getting at all the facts implied in the origin of Life and Consciousness, to afford any complete satisfaction, what rational hypothesis is allowable, so far as we are warranted in forming one at all?

I have, it will be noted, associated the word "Consciousness" with the word "Life" in my statement of the subject before us; and in so doing I have had regard to the differences of opinion that may arise as to whether they are essentially distinct, or only different aspects of the same question. It may be found as we proceed that "Life" in the opinion of some, and in some measure, is never existent without "Consciousness," and that consequently,

in accounting for the origin of the one, we have virtually said all that may be needful as to the origin of the other. Or it may turn out, as we proceed, that "Consciousness" comprehends much more than is implied in or connotated by the term "Life"; and in that case we shall have to mark the distinction, and, so far as they are radically different, seek to explain either their concomitant or their separate emergence. In any case it is well, in such a discussion as we are entering upon, to have what Leibnitz calls clear and distinct ideas on this matter of the relation of one to the other. The point at issue is not so easily decided off-hand as some may at first imagine. For its decision there is required a careful consideration of some of the most subtle and intricate phenomena presented in the history of the mental and the organic worlds. But of this more anon.

At the outset we have to accept the position that Life emerged in this world, in some most minute and elementary form, very far back in the earth's history as compared with the present, though not very far back as compared with the time of the first concentration of the earth's material. Whether we take 100,000,000 years as the extreme limit of time during which life has been possible on the earth, according to Sir William Thomson's calculation on the basis afforded by physical science; or 300,000,000 as required by Darwin for the rational structure of his hypothesis of Natural Selection; or 1,000,000,000 as some wild enthusiasts for organic evolution would claim—makes no real difference to us on this occasion. Evolutionists and *non*-evolutionists, such as Dawson, or Louis Agassiz, have equally accepted the fact that geological evidence conclusively points to the appearance of life on the earth, in the first instance, in some form extremely simple. So that the question for solution, if possible, is, How did that primordial form of life arise? From whence did it come? What conditions, if any, antecedent to it, issued in its appearance as a new phenomenon in the midst of a world otherwise exclusively inorganic? The importance of this question, and the difficulty of answering it, springs largely from the fact, which all scientific men of every school admit; namely, that the difference between the organic and the inorganic is most decisively marked. As we shall see, attempts have been made by some to minimise the difference with a view to a certain theory as to the origin of Life; but apart from theories of origin, and looked at as a phenomenon in the

world, it is admitted that there is a great gulf between the living and the *non-living*—the organic and the inorganic. Professor Huxley says, in his article "Biology," in the *Encyclopædia Britannica*, that "the properties of living matter distinguish it absolutely from all other kinds of things."¹ The smallest living speck known to science—though only $\frac{500000}{10000000}$ of a cubic inch—exhibits, as Dr. Dallinger has so wonderfully shown, the essential characteristics of the more elaborate organic structures. "It moves," he says, "with the agility of the grayling, and the grace of a swallow;" "it effects," by the assimilation of surrounding matter to its own, "analyses and complicated syntheses which . . . baffle all the synthetic chemistry of man," and, also, "it multiplies with astounding rapidity."² The problem is, then, to say whence came, in the past history of the earth, the first and simplest form of Life?

To the uninitiated it may seem to be an impossibility, apart from a source more than human, to make any affirmation, or to arrive at any probable conclusion, concerning the beginning of so strange and subtle a thing as the first organic creature millions of years back in the past; and probably there are some who are disposed to discourage all research and discussion in reference to it as being, in their judgment, something more than worthless. Need I say that such a procedure is really based on scepticism as to the functions of the intellect in relation to its surroundings, or else on an oversight of the conditions which regulate, and the conditions which restrict, the acquisition of knowledge. The vast accumulation of knowledge on all kinds of subjects, ancient and modern, close at hand and remote, patent to the eye and hidden in the deep recesses of Nature, during the last half century has surely taught us that our personal presence is not necessary to our knowing that a fact in the progress of Nature occurred, or that we must be able to analyse an event while in process of being brought to pass in order to know the causes that have entered into it. We know positively what the earth was millions of years ago, though none of us were there to look upon it. We know that gravitation acts in Neptune and in the sun, though we have never witnessed a stone or a world falling into them. We know something of how the sedimentary rocks were formed, and of the kind of materials from whence they came, though none like them may have been formed in our day. Although, of course, the boundaries of

¹ Vol. iii. p. 679.

² *The Creator*. Fernley Lecture, p. 30.

scientific knowledge are being constantly extended by actual observation, experiment, and due verification of both, yet it is also true that scientific knowledge is being extended by the application of principles, inductively obtained from such verified observation and experiment, to cases which lie beyond all observation, and in some instances incapable of verification. There are such things as universal principles, not only in the exact sciences, but also in natural sciences. Especially is there a probability that the progress of the Cosmos has been pervaded by a uniform law. It would seem to be the dictate of reason that the universe has been constructed on definite principles, so that the deductive application of principles inductively acquired is not only a legitimate process, but is the method adopted in all departments of research. It would be unnecessary to dwell on a point so familiar to many, were it not desirable, in a discussion like the present, to pave the way for the consideration of varying views without prejudice.

So far, then, we are on solid ground. We may reasonably approach the consideration of the origin of the first germinal life, though, with the use of our present assured knowledge, we may not be sure of reaching in every case an unassailable conclusion.

The next point to settle is the method by which it is possible to arrive at some conclusion, seeing that we were not there to make observations and apply tests when the event took place. Now, the actual mental process followed by those who have worked at the problem seems to me to have been something of this kind. It may be asked, first, whether there are any facts, or well-grounded conclusions, respecting the course of Nature—and especially respecting the successive changes in the upward line of the world's history—which may give a clue to, or serve to suggest, the conditions and circumstances antecedent to, and concurrent in, the first appearance of Life. In other words, Are we in possession of any scientific knowledge which points to, with any high degree of probability, the actual method chosen by Providence for the origination of Life? Then, it may be further asked, is there anything in the constitution of a living organism, as we now know it, which, physically considered, indicates the direction in which we are to look for its origin in the first instance? Can we reason back from what we now find to be in an organic structure to the formation of the simplest structure at the first? Still further, it may be asked, looking at the compounds that enter into present

living organisms, Is it possible by any application of skill in the combination of elements to approximately produce such matter at our pleasure? In other words, Can any animal matter be produced out of materials that have never been part of an animal structure, and, if so, does not this point to a certain origin of the first structure? Once more, it may be asked, Is it possible, by any observation combined with experiment, to discover and produce physical conditions, which, apart from the presence of any living organism, shall issue in the appearance of very minute forms of Life? In other terms, Can we artificially create circumstances and conditions analogous to those which may be presumed to have existed just before Life came into the world's order, and out of those circumstances and conditions observe Life now to originate *de novo*; i.e., apart from parentage or any super mundane power? And finally, should any or all of these methods of research combined ultimately fail in solving the question, it may yet be asked whether, exercising the right of speculative enquiry, anything is known to be, or may be reasonably believed to have been, inherent in the original constitution of the ultimate units which enter into the structure of all things, of such a subtle nature as, by development in the course of time, would account for the appearance of Life at an early age in the earth's history?

By way of anticipation and preparing for details, I may here say, that pursuing a course of thought, in whole or in part, like that just sketched, many scientific men of considerable authority believe that they have been able to arrive at a fairly satisfactory conclusion as to the origin of Life in the first instance. On reflection it will be found that there are only three conceivable means by which a living organism can come into existence: by parentage, *ovum ex ovo*; by some direct act of the Eternal from outside or within the line of Nature; or by the natural action of pre-existing conditions in the inorganic order, or in the ultimate constitution of things. Biogenesis, Creation, Abiogenesis, are the recognized terms for indicating the possible origin of Life. As to the first, Biogenesis—Life from Life—that is, of course, true of us and of the organic world as a whole. The smallest microscopic speck and the largest elephant owe their existence to a parent; and this law applies to the entire range of organic history covered by Palæontology. But obviously it is ruled out in reference to the first Life. There was no father of the first father. The

earliest organism was virtually more than an orphan. The issue then lies between Creation and Abiogenesis. In saying this, it should be understood that there are two uses of the term Creation. One is that which implies a direct act of Eternal Power—the Eternal energy acting *de novo*, and from outside or from within the course of Nature, according to the philosophy we hold to. The other is that which implies that ALL the processes of Nature are the outcome of Eternal Power—the forms of His energy, so that, as Descartes expressed it, the world in its development is an act of “Continuous Creation.” The issue to which I am now referring, in the opinion of many, lies between Creation as a direct act and the natural action of pre-existing conditions, which, to all except rank materialists, is practically the “Continuous Creation” of Descartes. The immediate question is, then, What is the evidence adduced for the exclusion of any conceivable origin of Life except that it was the outcome of the natural action of pre-existing conditions?

The *first* consideration, in the logical order, is that derived from the recognition of the Scientific Principle of Continuity. There is a common tendency in us all to seek what is termed some natural cause for everything we see—some antecedent condition of things out of which it arose. The child asks, What does the bubble on the water come from? and when he is informed of the natural cause, he marvels and is satisfied. The chemist seeks to find the cause of ordinary gas being inflammable; and when he traces the flame to a set of concurring physical antecedents, he marvels and is satisfied. This tendency in human nature has been the spring of all research, and, in the hands of Science, has issued in the formulation of a principle known as that of Continuity; *i.e.*, there is a continuous connection in the antecedents and consequents which make up the sum of events in the course of things. It is well known that the Principle of Continuity, as expounded by Sir William Grove, and recognized in all departments of modern science, and sanctioned by the philosophical demand for unity, carries with it, when we come face to face with any strange event and want to know its genesis, a logical force hard to resist. When it is observed in all the natural and physical sciences, and also in psychology, that every event, or change in the appearance of things, is preceded by some other event, or change, or condition of things which stands to it in the relation of

cause, or one of the causes, that explain its emergence ; and when the common every-day observation of the untutored points in the same direction, it is obvious that we are on the track of a principle that must exercise a potent influence in our interpretation of things. It is this uniformity in the connection of antecedents and consequents which constitutes the stability of the course of Nature, furnishes a reliable basis for all our calculations in practical affairs, and, in fact, renders it possible to attain to a rational conception of the material and social order. As applied, then, to the question of the origin of the first organic form, it raises an *a priori* presumption in favour of its being included within the order of Nature ; in other words, that it is to be referred to the natural action of some antecedent condition of things. It would require extraordinary reasons to compel the belief that, in the emergence of Life on the earth, the Continuity everywhere else prevailing comes to an end, or rather is broken in twain. To evolutionists the argument seems irresistible. For there is abundant reason for thinking there was unbroken Continuity in the succession of changes which, through myriads of years, occurred in the passage of the primordial units of matter, from their state of diffused simplicity up to the highly differentiated condition of things on the globe just prior to the appearance of the first life ; and, unless the hypothesis of Organic Evolution be a delusion, there has been unbroken continuity in the outcome of Life from Life from the first dawn of Life up to the present. There was one law of things before Life appeared, and there has been one and the same law of things ever since Life appeared. Continuity runs through the two lines. Is, then, the emergence of Life, in the first instance, the only exception to the law of all phenomena ? Is Continuity broken only once in the history of things ? Philosophical love of unity, scientific generalizations, and plain common-sense would seem to say "no." Continuity has not been broken. The emergence of Life must surely have been in keeping with the otherwise universal law ; *i.e.*, Life came from the natural action of some pre-existing condition of things.

I have thus sought to put the argument from Continuity in as clear and forcible a way as possible because of its great importance, and because it is one on which great authorities agree, though they may differ among themselves as to what were the antecedent conditions out of which Life arose.

Before proceeding to notice the different explanations that have been proposed of the pre-existing conditions out of which Life is said to have come, it may be useful to see what can be said on the other side with respect to this argument from Continuity. For if this *a priori* reasoning is unassailable, the whole case is closed as to the general question, though not as to the precise conditions out of which in pursuance of Continuity Life evolved. Now, I can imagine a thoughtful man taking some such position as this: "You say that in the generally admitted Principle of Continuity, as understood in modern science, and as now explained by you, you find an *a priori* presumption in favour of your view of the origin of Life. Well, I am prepared to admit Continuity, though, of course, the real question now is whether it is absolute or relative. If it is absolute, universal, of course your view of the origin of Life is right. I cannot, however, allow *that* in this argument, because *that* is the whole question at issue. I grant that, in making out Continuity up to the appearance of Life, and then Continuity after its appearance, you do make out a very strong case—a case which is not to be set aside by a sneer at your great knowledge, or any *ex cathedra* assertion. At the same time there are a few suggestions which I would respectfully submit for your candid consideration. In the first place, you know how, in days gone by, Lord Bacon rather objected to the reasoning of Schoolmen because of its being based largely on *a priori* considerations; and, although we live in enlightened times, I am not aware that we have quite got rid of the feeling of risk in trusting freely to presumptions founded on *a priori* considerations. They are more suited perhaps to the deductive metaphysician than to the investigation of natural facts. But, as we are dealing with *a priori* presumptions, may I remind you of a very important fact; namely, that the chief authorities in natural science are one in declaring that the law of Nature now is, and all along through the palæontological ages has been, that Life only comes from Life. Now, does not so uniform and steadfast a course of Nature, extending over millions of years, raise the counter presumption to yours, that the origin of the first Life is certainly not to be sought in that which was not living? Do you think it seemly for Nature, bearing her numerous children? That does not look like Continuity, the mother you say of us all, to have two distinct methods of in one sense of the word, at least. And if you think that Nature

could do her work far back in the past in a way different from that in which she has been accustomed to do it ever since, because the atmospheric conditions were different, are you not burdening your position with multiplied hypotheses? Of course, you will admit that the atoms and their wonderful original adjustments in permanent mathematical proportions had a beginning—a Cause beyond themselves. Does it then seem to you an incredible thing that, after the play of atoms had progressed in beautiful Continuity, for myriads of years, till they reached the point of their evolution that would fit them to be the vehicle and instrument for the co-ordinated action of some higher and *non*-physical increment, that, then, the Cause of the original atoms and their adjustments should originate that *non*-physical increment? Would that action of introducing a *non*-physical increment that henceforth, in a continuous line, is to perpetuate itself, substantially, or at all, affect the real Continuity of the physical conditions that were to serve as its vehicle and instrument? Nor is this question unwarranted by actual facts. For, if I may anticipate what I may say later on, is not Consciousness a *non*-physical factor which, some time in the long evolutionary progress of the material system, has been added as a correlative or concomitant to the physical order? Nor can I help reminding you that, though Determinism does prevail in Nature, yet somehow, at some point in the progression, Moral Freedom has emerged—certainly not from its contradictory, Determinism. I submit such considerations to your careful judgment, so that you may, at all events, see that I am not necessarily ignoring the true physical Continuity, when I confess my utter inability to see how the phenomena involved in the living organism can be alone explained, as to origin, by the molecular and chemical laws that operate in the inorganic system of things. In fact, I wish you, my dear friend, to understand that, taking into account *all* the facts which present themselves to my vision, such as the existence of a rigid physical order, of Life, of Consciousness, and of Moral Freedom—four distinct, ascending factors of the universe—I feel myself to be standing in the midst of a vast and mysterious system of things, in which factors of a very dissimilar type find scope for existence; and that, therefore, I can, on rational grounds, ascribe the beginning of each of these factors to a common original, without affecting the true Continuity which pertains to the evolution of each of these when once they

are originated. Possibly my position is one you, at present, on the spur of the moment, may hesitate to accept; but I commend it to your consideration as one most reasonable."

Leaving then the *a priori* disputants to ponder over the probabilities and improbabilities which each presents for the consideration of the other, we may now turn to notice the character of those antecedent conditions of things out of which it is said Life, in the first instance, emerged. I have already intimated that authorities are not agreed as to what these conditions were.

The most pronounced and prominent authorities are those who regard the first life as simply and solely the result of the action of the pre-existing dead matter, and the physical forces acting in it. This school is often and truly called the "mechanical," because, according to the physical system they adhere to, all chemical forms and actions are, in the last analysis, supposed to be the outcome of one mechanically-acting force. The most explicit and most aggressive of the school is, perhaps, Büchner. His words admit of no two interpretations. He says, "The facts of physical science PROVE, with considerable certainty, that the organic beings which people the earth owe their origin and propagation solely to the conjoined action of natural forces and materials."³ Again, "Whence came organic beings? . . . It is from the simplest organic elements produced in the way of Spontaneous Generation by the combination of inorganic elements."⁴ And it should be observed that all forms and varieties of inorganic matter, according to Büchner, sprang from the mechanical interaction of the primordial form of matter and force, so that Life is the resultant of all previous interactions. There are some evolutionists who are disposed to rest chiefly, if not entirely, on the general proof of evolution as being, in principle, sufficient to cover the question of Life—feeling sensible of the extreme difficulty of adducing anything like cogent positive proofs of an event so remote, and admitting frankly that Life itself is too subtle and structurally impenetrable for the highest human skill to explore and fully analyse. But there are bold men in science as well as in athletics, and so it has been attempted to furnish scientific *data* for the conclusion believed to be indicated by the principle of Continuity. Let us look at these *data*.

The origin of Life is, it is thought, indicated by the *unstable*

³ *Force and Matter*, p. 72.

⁴ *Ibid.* p. 82.

character of the elements entering into the composition of organic bodies. Or, to put it in another form, the elements of which organic bodies are composed are such as would issue in a remarkable degree of instability; and, therefore, they form a combination most suited, from a chemical point of view, to undergo metamorphic changes such as do actually characterize living things.⁵ The principal ingredients of organizable matter are six: C. O. H. N. S. Ph.⁶ Now between some of these elements there is the most extreme diversity in respect of molecular mobility and chemical activity; *e.g.*, C exhibits a degree of atomic cohesion not found in the others, O displays the greatest chemical energy, and N the lowest degree of activity. These immense differences in the component elements of organizable matter afford scope for just these subtle and readily-produced changes, through the action of incidental physical forces, which are characteristic of what are called vital phenomena. Whatever subtlety and mysteriousness there may be in that we call Life, may, then, be reasonably ascribed to this chemico-mechanical source. In other words, an analysis of the chemical constituents of living bodies will lay bare just such unstable conditions as are likely to issue in those peculiar phenomena of change which distinguish the organic from the inorganic. The organic would thus seem to be only a name for the inorganic under special conditions of instability. Protein substances, such as Albumen, Fibrin, Casein, Globulin, and others which form the essential constituents of living tissue, are found to accord with this analysis.

But, also, certain *compounds called organic are producible by artificial means.*⁷ Compounds which were once supposed to be the sole product of a special force, or set of forces, called "vital," are now shown to be the product of the chemist's skill; and the hope is that chemical skill will more and more solve the so-called mystery of "vital" phenomena, so that the hypothesis of Life being essentially different from what else is in the inorganic universe need not be entertained. There is a well known philosophical principle termed *Parcimony*; that is, the avoidance of a multiplication of causes. What can spring from one known cause in Nature need not be supposed to come from some other.

⁵ SPENCER'S *Principles of Biology*, i. pp. 1-20.

⁶ HUXLEY'S *Physiology*, p. 134.

⁷ BASTIAN'S *Beginnings of Life*, pp. 86-94.

Nature abhors superfluous ways of effecting her ends as truly as she does a vacuum. It is true the production artificially of organic compounds, as yet, has been only indirect by successive combinations of simpler combinations, not directly out of the simple elements themselves; but, to whatever extent this has been done, it serves as a finger-post to point to the truth that the word "vital" is only a name for those incidental forces which were found to be in action in all inorganic bodies, only that in the organic they assume a more complicated and unstable relation one to the other. The interaction of matter and force is the clue to all.

Further, there is known to be but *one formal basis of life entering into living things*. That is, there is a certain definite physical combination which is known to be present where there is life, which is not present where there is not life, and which is the basis of all that is built up and done in connection with life, and which, in so far as we have any right to speak, is the only basis of whatever is covered by the term "Life." If there be any distinctive property requiring designation by coining the word "Life," that property is simply the peculiarity exhibited by, and consequent solely on, a certain ascertainable combination of physical elements, much, as in the same way, we say that magnetism is a property of matter under given conditions. This, in brief, is the doctrine of Protoplasm or Bioplasm. It is really a development in a particular direction of the cell theory with which Professor Virchow's name among others is associated. Haeckel, Schultze, and others have pushed the theory so far as to affirm that even the membrane and the nucleus are subordinate—the real thing being the intercellular matter.⁸ That this Protoplasmic or Bioplasmic matter is the basis of all Life from the lowest to the highest is argued from the following facts: (1) The *powers* of all kinds of living matter, however diverse in degree, are substantially similar in kind. In the lower organisms the same Protoplasm performs all the vital functions of feeding, growing, moving, multiplying. (2) The fundamental *forms* of all living matter are substantially the same. The spheroidal nucleus is the type rigidly adhered to. In the lowest living things the whole structure may consist of such a form, and the whole structure of the higher animals may consist of transformed shells

⁸ HAECKEL'S *History of Creation*, i. p. 188.

of the successive nuclei of the one simple substance. (3) The *composition* of the substance of living matter is the same in all organisms. Protoplasm differs from ordinary matter in the manner in which its atoms are aggregated. It is found in what we call "Life" to break up into carbonic acid, water, and ammonia. That is its chemical resolution. Plants take up carbonic acid, water, and ammonia. That is its chemical reconstruction. But carbonic acid = C and O; water = H and O; ammonia = H and N.; so that the constituent elements are C O H N.⁹ But just as H and O mixed in certain proportions become the same quantity of water when an electric spark passes through them, so when carbonic acid, water, and ammonia are subjected to the influence of living matter in a plant, they become Protoplasm or living matter. And as, in the one case, water is only a certain aggregate of atoms, so in the other, Protoplasm is only a certain aggregate of atoms of ordinary matter. There is no "vital principle" or any mysterious thing otherwise named or unnamed.¹

In view of such considerations, which are the accepted representations of the mechanical school, Haeckel says: "It is one of the greatest triumphs of recent Biology, that we are now able to trace the wonders of the phenomena of life to these substances, and that we can demonstrate the *infinitely manifold and complicated physical and chemical properties of the albuminous bodies to be the real cause of organic or vital phenomena.*"² He also says that the difference between organisms and anorgana arises from the different manner in which the chemical and physical substances are united.

It is, however, only fair to say that men less imaginative than Haeckel admit a few qualifications to the above representation of the characteristics of the basis of life; namely, the experiments made on it to test its chemical composition are all made on dead Protoplasm. No means have been discovered of analysing it while living. Plants can manufacture new Protoplasm out of minerals, but animals can only procure it ready-made in animals or plants. There is no direct passage of the mineral into animal

⁹ Cf. a different representation in *Contemporary Review*, September, 1876. p. 553.

¹ See HUXLEY'S *Lay Sermons*, Lecture vii. But cf. BEALE'S *Bioplasm*, pp. 1-75.

² *History of Creation*, i. p. 331, cf. p. 339.

living structure. We know of no Protoplasm being formed except where there was already living Protoplasm to perform the operation of taking up either the minerals, in the case of plants, or the dead Protoplasm, in the case of animals.

There is one other statement made to confirm the preceding argument. It is this, that there is a large class of living things which partake as much of the vegetal as of the animal, and serve as a transition, or medium, between the simplest vegetal and the lowest distinct form of animal life. It may possibly be regarded as the stem from which two divergent branches issued. Speaking of these Protista Haeckel says they display no distinct affinities nearer to one side than the other.³

There is another consideration which with some has had great weight in years gone by, and has with a few now; but as it is repudiated by many who would be disposed to look favourably on the positions now advanced, it may be well to pause and examine the amount of force there is in this argument from the instability of living matter, the artificial production of organic compounds, and the peculiarities of the common basis of life.

The first question of fact is the asserted *instability of the elements of which organizable matter is composed*. This question is most intimately connected with the strong assertion of such Biologists as Beale, that, whatever the elements entering into living matter may be, between its living state and its non-living state there is an absolute and irreconcilable difference.⁴ It should be observed that Beale's assertion is a fact of science. Whether the claim that this is to be explained by the existence in living matter of some undefinable thing beyond the bare collocation of atoms be admitted or not, it is obvious that, supposing it to exist, unstable elements as its vehicle would assuredly more subserve its purpose, or, if that be too teleological an expression, its manifestation, than would elements of less instability. So that, regarded as a matter of pure argument, and it is in that light alone that I wish to regard it, the instability of organizable matter would be no more evidence that there is nothing besides the elements than that they are agents of a very subtle *non-molecular* reality. The argument proceeds on the assumption that if there

³ *History of Creation*, ii. pp. 47-51. Cf. BASTIAN's *Beginnings of Life*, i. pp. 115-118.

⁴ *Bioplasm*, p. 3.

were in the nature of Life any such subtle thing, it would be sure not to manifest its presence in connection with unstable elements. That can never stand. Besides, if it were so clearly, as Haeckel and Büchner seem to make out, a question of elements entering into compounds, it is singular that combinations are not formed of the actual elements which are found by analysis to enter into living matter so as to issue in Life.

The next question of fact is that *Protein lies at the base of all organic compounds, and can be produced by the chemist's skill*. I have stated the view of one side; but we ought not to overlook what others have said in reference to the point in question. The term Protein was first applied by Mulder to a precipitate consisting of a gelatinous substance devoid of sulphur, and obtained from Albumenoids by boiling and adding acetic acid. He held this to be the fundamental compound in the albumenous substances, in each of which it was contained with different small proportions of sulphur, phosphorus, and salts. The question as to what Protein is, and what its relation to Albumenoids, is one for analytic chemistry; and the question as to whether it can be artificially produced is one of fact. And that being settled, the next is, whether the artificial product is of the same kind as the matter essential to the existence of Life, and is a cause of vital phenomena. All that is proper for the present occasion is to note what authorities have to say. Gregory, in his *Organic Chemistry*, page 316, denies that this theory of Protein being the base is demonstrated, and assigns six formal reasons against it. So that even though Mulder, and Bastian who follows in that direction, can indirectly produce Protein, which = $C_{48}, H_{41}, N_5, O_{12}$, it does not follow that it is an organizable compound as understood by Gregory. Moreover, Kane, in his *Chemistry*, page 666, says in reference to the same, "The Protein I consider not with Mulder as the basis of our tissues, but as the simplest product of their decomposition. It enters into combination with acids and with bases, as indigo and morphia, which I look upon as totally foreign to the character of a body possessed of vital properties." Also Miller, in his *Organic Chemistry*, part III., p. 745, speaking of Albumenoids, says, "Owing to the complexity of their composition no satisfactory rational formula can at present be assigned to them; and owing to their indisposition to crystallize, great difficulty is experienced in obtaining them in a state of purity,

and of ascertaining when they are free from foreign mixture." And on page 752, after discussing Mulder's speculation, he concludes, "The nature of this substance and its relation to Albumen require further examination. Indeed, the existence of the whole of these Protein compounds as distinct principles must be admitted to be very problematical." He gives Protein as C_{36} , H_{27} , N_4 , O_{12} . Chemistry is a progressive science, and such evidence might be deemed now rather antiquated. It is important, then, to note how the most modern investigators concur in these general results of their predecessors. Roscoe in his *Elements*, p. 438, says that we are as yet very ignorant of the true chemical relations of Albumenoids, and, p. 442, that "our knowledge of the composition and chemical constitution of the substances contained in the animal body is very incomplete." And as late as 1887, in his address as President of the British Association, he says, "One cannot help feeling that the barrier which exists between the organized and unorganized worlds is one which the chemist sees no chance of breaking down. No such problem lies within his provinces." To complete this list, I may refer to the words of the great French analyst, Pasteur, who, in a remarkable passage recorded in the volume describing his *Life and Labours*, pp. 26, 27, shows by rigid chemical analysis that there is a real distinction between artificial compounds and the matter of Life.

Of course, such statements have only an indirect bearing on the main question of the origin of the first Life; but if we would be impartial judges we cannot but allow them due weight against the claim made by some to prove the evolution of Life from purely inorganic conditions, by the asserted possibility of artificially producing organic compounds. There are more sides than one to this question.

Turning next to the nature of Protoplasm in its bearing on the origin of Life, we have to distinguish carefully between admitted facts and the inferences drawn from the facts. That there is a certain physical arrangement involved in the existence of Life is, of course, involved in the fact that Life as we see it is not a purely spiritual thing, but, be it what it may, is exhibited in a material organism; and that all forms of Life should have the same physical basis does not, as it seems to me, touch the question as to what Life itself is. To say that *it* itself is the said physical basis

is to speak tautologically. Basis, and that of which it is basis, are not identical. I pass over the circumstance that Stricker and other German chemists give a somewhat different analysis of dead protoplasm, and that Beale complains of the tendency to apply the term to formed, as distinguished from forming, matter.⁵ It is perhaps more to the point to remark that seeing, as Huxley admits, all we know of the composition of Protoplasm is that of dead protoplasm, this can throw no real light on what living protoplasm is. The tenant has vanished from the house. Hamlet is not in Hamlet. To a lay mind it would seem to be reasonable that there must be something in the living speck which cannot come under any test to which the dead speck is subjected; and it is that mysterious something which performs the wondrous operation of converting dead substances into living matter. The mystery of Life remains as great as ever.

There is also one difficulty which some feel in accepting the implication of this argument from the nature of Protoplasm. For, observe, the argument seems to proceed on the assumption that if there be such a common physical basis as described, there need not be any organizing power *sui generis*—nothing other than what is implied in the mere interaction of the chemical substances that make up the basis. “Aquosity” is not needed to form water, and so no other “ity” is required to account for the phenomena of Life. The interaction, or its resultant, is the elective power which abstracts material from surrounding substances, and causes them to become “living.” Now, one solid objection to this supposition which rises to ordinary, and to some scientific, minds, is this; that the hypothesis does not sufficiently account for the diversity in the selection of surrounding substances for conversion into living matter. The protoplasmic cell of a nettle, an oak, a primrose, a cabbage; and of a fly, and an elephant, and a dog—is, according to the hypothesis, of the same chemical elements, of the same powers and form of action, and yet they lay hold of unlike substances to convert them into their respective living matter, and turn the matter so seized and assimilated into such diverse combinations and uses. We might suppose that they, being exactly alike in composition and powers, would only assimilate the substances that were common in their respective environments.

⁵ *Bioplasm*, pp. 9–18, 73. Cf. STIRLING'S *As regards Protoplasm*, p. 24; *Contemporary Review*, September, 1876, p. 553.

To a common-sense view of the case there certainly seems a need of an elective power that can reject and take, a power that can organize different structures out of the materials assimilated. It can scarcely be solely a question of chemical affinity, seeing that the chemical composition and powers are said to be the same in every case. It is no disregard of Nature to confess that there are mysterious powers; and that, in presence of such a fact as consciousness, it is possible that there should be more in the world than the everlasting dance of mere atoms—that, in fact, there may be a nameless *unique* power, varying in degree in differing forms, and standing, in the constitution of the world, midway between atomic action and the impenetrable mystery of consciousness. Science has not yet solved the inner mysteries even of "Force." It only brings us to the border of the unseen region wherein lie the secret springs of all visible forms and changes. It is true, advantage may be taken of this admission to ascribe vital phenomena to the untraceable forces that operate in matter as matter, but no such speculation will obtain the sure position of a scientific conclusion; and, as a speculation, it may be, and is, invalidated by the presence of facts which a different hypothesis may more thoroughly solve. Philosophical unity is certainly desirable. Differing physically, forces are made to square with the demand for unity in being run up into one force. Philosophical unity may perhaps as truly be obtained by the admission of (1) primordial physical force, (2) the unique thing implied in consciousness, and (3) the unique organizer of living matter, and by then running these different lines, constituting a varied universe, up unto the one Eternal Source.

But it would not be right to leave this question of Protoplasm without a word on the comparison instituted between the formation of crystals and living matter. Haeckel has devoted many pages to show that as the one is the sole result of mechanical force, so the other may be and is; only the mechanical action, in the case of organisms, is hidden under chemical forms. The reasoning is certainly plausible, but those who take another view of Life urge such considerations as these. Crystals and living things are too wide apart to be compared for the purpose in view. The one is simply added to by external contact; the other turns the external matter into its own living nature—mere contact disappears. The one is a mere aggregation from without, in rigid

mathematical lines, modifiable at pleasure by the introduction of new elements into the surroundings, devoid of internal movement and absorption of new matter from without. It is, in reality, a minute pack of bricks. The other is mobile, active throughout its entire substance, moves towards other substances, transmutes them by a power very unlike mechanism into itself, and can only arise from its own kind. It is true, we do not know why in a certain crystal the particles should always lie at a given angle in relation one to the other; but we do know that the mutual action is external, and can be varied at pleasure by the chemist's skill. There is a singular remark of Lester's—no mean authority—which, though not made in reference to living matter, as contrasted with crystals, serves well to indicate the enormous remove of the one from the other, and to imply, at least, the high probability of some unique power or elective agency. He says: "We know that it is one of the chief peculiarities of living structures that they possess extraordinary powers of effecting chemical changes in the materials in their vicinity, *out of all proportion to their energy as mere chemical compounds.*"⁶

I have hitherto explained the proofs which the mechanical school adduce in support of the hypothesis suggested by the Principle of Continuity; namely, that living matter in the first instance arose out of some prior condition of things, and we have noticed what can be said on the other side as to the value of those proofs. But there are a few valiant advocates of the hypothesis, such as Büchner and Haeckel, who even go so far as to assert that Life *now* can be produced out of inorganic conditions. As a rule Naturalists consider that the doctrine of Biogenesis, *ovum ex ovo*, alone applies to life now, either in the way of Bioparadosis, transmission; or Biocaenosis, renewal; or Biodiaeresis, fission; or Biocrasis, fusion. It is probable that Aristotle and Lucretius held the view that, in addition to Biogenesis, Life still occasionally sprang from non-living matter. In our own country vulgar belief, even in the year 1638, had connected the appearance of small vermin with changes in the inorganic world; and in the eighteenth century the expression "Spontaneous Generation" was invented to indicate the nature of the change. There is much in the expression that is fascinating to a certain order of mind; and the frequency with which animal Life appears to spring in

⁶ Quoted by Tyndall in *Fragments of Science*, p. 148.

abundance from decayed matter, and in out-of-the-way places, gives a semblance of truth to the conception. It was only natural that eager advocates for the origin of the first Life from inorganic matter should desire the support of science for the doctrine of Spontaneous Generation in our own day, since, if that be established, the whole question of origin is once for all settled. It would be tedious to go into the detail of experiments that have in abundance been made to test this question. Of late years the most persistent and voluminous writer in England on the subject, Dr. Bastian, has endeavoured to show, by experiments he himself has made, and others also, that, all care being taken to exclude the air and destroy existing germs in the solutions employed, distinct instances have occurred of living forms coming into existence out of purely dead inorganic matter.

Considering that in the judgment of the most competent scientific men in Christendom this doctrine of Spontaneous Generation is utterly discarded, it is not necessary to enter into any particulars as to methods by which it has been set aside as absurd. But for the sake of those who may not have followed the controversy now ended, I may be allowed to point out one or two considerations and facts which justify this strong language concerning it.

It certainly looks suspicious that Nature should be so prodigal as to break the law of Parcimony in thus having *now* two concurrent methods of originating life—Spontaneous Generation and Life from Life. The idea of there being anything “spontaneous” in an ordered system is incredible to anyone who reflects on what law and order mean. Dr. Tyndall, who of all men had no reason for objecting to the idea of Life springing from inorganic matter if possible, carried on with marvellous skill a long series of experiments of the most rigorous character, and came to the conclusion reached by others equally eminent in their department, that “it is unlikely that the notion of Bacterial Life developed from dead dust can ever gain currency among the members of a great scientific profession.”⁷ It may be interesting to be reminded of Professor Huxley’s reply to Dr. Bastian, when he, Dr. Bastian, brought some of his living results from dead matter for his personal inspection. “At any time these six months Dr. B— knows perfectly well that I believe that the organisms which he

⁷ *Fragments of Science*, p. 7.

has got out of his tubes are exactly those he has put into them; that I believe he has used impure materials, and that what he imagines to have been the gradual development of Life and organization in his solution is the very simple result of the settling together of the said impurities which he was not sufficiently careful to see, in their scattered condition, when the solutions were made. He will recollect that he wrote to me asking permission to bring for my examination certain preparations of organic structures, which he declared he had clear and positive evidence to prove to have been developed in the closed digested tubes. Dr. B—— will remember that when the first of these wonderful specimens was put under my microscope I told him that it was nothing but the fragment of the leaf of the common bog moss (*Sphagnum*); and he will recollect that I had to fetch Schacht's book (*Die Pflanzenzelle*), and show him a figure which fitted very well what he had under the microscope, before I could get him to listen to my suggestion.”⁸

If then, on such great authority, Spontaneous Generation must be set aside, the question naturally arises, How does such a result affect the position that Life, in the first instance, sprang from the pre-existing inorganic matter? It is noticeable that Haeckel is especially sensitive on this point. He says, “If we do not accept the hypothesis of Spontaneous Generation, then, at this one point of the history of development (*i.e.*, when life first appeared), we must have recourse to the miracle of a supernatural creation.”⁹ It is only right to say that this despair on the part of Haeckel is not shared by others who are as rigid as he is in the application of the principle of Continuity; and he himself, with queer inconsistency, in another part of the same work, refers to the probable difference in the condition of Carbon and the state of the atmosphere in the remote past, as accounting for the evolution of life from inorganic matter then and not now.¹ Mr. Spencer is perfectly consistent in the view he takes while rejecting Spontaneous Generation as unscientific. He takes pains to show that there was, in his judgment, an almost interminable interaction among the primitive molecules before even compounds called organic were formed; and that ages of subtle interaction and evolution were

⁸ *Nature*, October 30th, 1870. Cf. *Ibid.* vol. ii. pp. 400–403.

⁹ *History of Creation*, i. p. 348.

¹ *Ibid.* i. pp. 330–336.

required for the production of a definite living organism out of organic compounds purely chemical. The probability is that the compounds so slowly formed, issued just as slowly in the lowest form of life at a time when the heat of the earth's surface was falling through those ranges of temperature at which the higher organic compounds are unstable. But the moulding of these compounds, by this slow process, into the simplest types, must have commenced with portions of Protoplasm (*i.e.*, with making portions of Protoplasm) more minute, more indefinite and inconstant in their characters than the lowest speck of Protoplasm in the Protista of Haeckel.² Professor Huxley virtually agrees with the above representation, though he will not commit himself to any definite statement as to mode and duration of the process. He states that he has no *belief* as to the *mode* in which existing forms of life have originated, but that were he able to look back "beyond the abyss of geologically-recorded time to the still more remote period when the earth was passing through physical and chemical conditions which it can no more see again than a man can recall his infancy, I should *expect* to be a witness of the evolution of living Protoplasm from *non* living matter."³

As an ingenious guess at the origin of Life from purely mechanical action of ultimate atoms, I may mention a speculation of the late Professor Clifford. The question is to explain how living matter acquired its peculiarity of producing its like. It may have arisen, he says, in a first step in the progress towards the development of the actual living molecules. He takes a molecule, acetelyne, formed of two carbon atoms and four hydrogen; and from three of these he gets, by an experiment, the molecule known as benzene with its six carbon and six hydrogen atoms. When once the first step is taken, and the new compound is formed, "it has the property of assisting the formation of its like," but "nobody knows why. . . . It is impossible to disprove the statement" that benzene cannot be made out of simpler molecules without some few molecules of pre-existing benzene. There is no test delicate enough for the disproof. But it is generally held that the benzene molecule is formed by the collision of three acetelyne molecules in favourable positions; this collision is a *coincidence*

² *Principles of Biology*, i. pp. 480-482.

³ *Critiques and Addresses*, p. 239.

which in this case takes place very often in a second.⁴ Having so established the idea of *coincidences*, the argument passes on to the more complex molecules which form the first living matter; and it is supposed that coincidences arise, by which a living molecule is formed in the same way as benzene. But, it is admitted, this would be far away from a speck of Protoplasm, and thousands of years of evolution would be necessary for the passage of the one to the other. The reason assigned why this sort of Spontaneous Generation does not occur in our experiments is that there is not time enough in the limits of our observations for a *coincidence* of the "favourable position."

If this is the last and utmost that can be said with a view to the scientific explanation of the origin of Life on purely mechanical principles, I think the most we can say, in consideration of the probabilities and improbabilities of such a purely chance coincidence, is, *non solvitur*.

I think it must be obvious that the position taken, though differently set forth, by Mr. Spencer and Professors Huxley and Clifford is different in reference to the main question, from that taken by those who adduce specific proofs and evidences of the origin of Life from the inorganic, from Spontaneous Generation and other disputable hypotheses relating to present-day occurrences and conditions of organic matter. They push the principle of Continuity to its logical issue, and speculate as to a process involving the gradual emergence of Life from the primordial atoms; and inasmuch as the Spencerian system of evolution makes all chemical conditions, and probably the very elements themselves, the outcome of the original kicking of ultimate units of matter one against another, it follows that Life is the outcome, in the last analysis, of a mechanical interaction of the ultimate atoms. It would be too great a work here and now to enter on an examination of, or to formulate, difficulties connected with so vast a scheme of philosophy. I may, however, say that there are men prominent in science who think they see inseparable difficulties in accepting such a view of the origin of Life. There still remains the inherent difficulty of forming any rational conception of the passage from mere mechanical or chemical interactions to that marvellous elective power towards a definite end which characterizes the vital phenomena. Even so great an

⁴ *Contemporary Review*, August, 1888, p. 202.

authority on molecular physics as Professor Stokes says, in his Presidential Address before the British Association, "Admitting to the full as highly probable, though not completely demonstrated, the applicability to living beings of the laws which have been ascertained with reference to dead matter, I feel constrained, at the same time, to admit the existence of a mysterious *something* lying beyond, a something *sui generis*, which I regard not as balancing and suspending the ordinary physical laws, but as working with them and through them to the attainment of a designed end."

Thus far then I have endeavoured to set one over against another, with as much impartiality as possible, the *pros* and *cons* with respect to the origin of Life from purely inorganic materials. But I have already intimated that there are some who, for what they deem good reasons, reject that view; and yet, pushing the principle of Continuity to its logical issue, maintain that Life in the first instance did come from some prior condition of things—only not from dead matter. It would occupy too much time to enter into particulars. A brief statement must suffice.

The remark of Professor Stokes just quoted touches the point of departure from those who hold to the first Life being only the more definite development of pre-existing physical conditions. That in the organization of the first Life there were in full force the laws which necessarily govern all material combinations is highly probable, since an organism, being made up of molecules, is an embodiment of certain chemical and molecular principles; and it is this physical aspect of the case which leads some to the conclusion that the physical laws thus embodied in a definite organism grow to be what they are in that organism out of something physical but less definite, and that they and the constituent atoms are all that makes up the so-called Life. It is this view which accounts for some of the definitions of Life found in the works of Biologists; *e.g.*, "Life is the co-ordination of actions;" "Imperfect co-ordination is disease;" "Arrest of co-ordination is death." (Spencer.) But there surely is, says Professor Stokes, not only this, but "something beyond." The same conception was entertained by the late Professor Stewart, who says that Life is to be regarded rather as a "consummate strategist, who, sitting in his secret chamber over his wires, directs the movements of a great army."⁵

⁵ *Unseen Universe*, p. 145.

In this connection I cannot pass over the contribution towards the solution of the question offered by Hermann Lotze, a name justly honoured in Germany and England among those who seek to traverse the higher realms of philosophic thought. Lotze's conception of the origin and also development of Life is both "mechanical" and not mechanical. In an essay contributed to Wagner's *Hand-Dictionary of Physiology* he advocated the claim of the mechanical view to a place in the science of Physiology. He taught that the existence and processes of actual Life and its propagation could not be understood without implying an ordered action in the particles entering into the structure—action necessitated by law. In his *Metaphysics*, published many years later, he maintains the same view, only that he guards it from inferences which appear to have been drawn from his earlier representations. He considers that the assumption of a Vital Force is not warranted, while at the same time he admits that there are no means at our command that will enable us to manufacture artificially a product which even remotely resembles a living organism. His position with reference to mechanism is thus expressed: "I simply adhere now to the decision which I then expressed. In order to explain the connection of vital phenomena a mechanical method of treatment is absolutely necessary. Life must be derived, not from some peculiar principle of action, but from a peculiar mode of utilizing the principles which govern the whole physical world. From this point of view an organic body will appear as a systematic combination of elements, which, precisely because they are arranged together in this form, will be able, by conforming to fixed laws in their reciprocal actions, and by the help of external nature, to pass through successive stages of development, and within certain limits to preserve the regularity of its course against chance disturbances." But then he goes on to add, "This makes me the more sorry that Physiologists should regard this view, which embodies the necessary regulative principles of all their investigations, as being also the last word on the subject, and should exclude every idea which is not required for their immediate purposes, from all share in their ultimate conclusions. But they will never remove from the mind of any unprejudiced person the overwhelming impression that the forms of organic Life serve an end; nor will men ever be persuaded that this marvellous fact does not call for explanation.

by a special cause.”⁶ This “something else beyond,” or in excess of the bare mechanism of atoms, he represents as being, not a separate entity, not a collateral independent power, but “the combining movement of the Absolute.”⁷ This it was which originally caused, and still in every vital change does cause, the attainment of the ends so conspicuous in a living thing.⁷ Life, then, springs from the rational immanent action of the Absolute, in such a way as to utilize universal mechanical laws to specific ends. The solution is metaphysical; but, says Lotze, it is necessitated by the inadequacy of the purely mechanical view to satisfy the reason.

Besides that of Lotze three distinct solutions have been proposed of the “something beyond” mechanical action. *First*, that matter in its ultimate condition was, besides those peculiarities which come within the scope of physical and chemical science, endowed by the Creator with a subtle latent quality for which no name can be found, but which, in fact, was the germ of that peculiar manifestation which appeared later on in the course of the evolution of matter, and to which we, observing the unique characteristics of its phenomena, give the name of Life. In this sense original matter would contain within itself the potentiality of all that, in the course of the evolution of Life, seems to be unaccounted for by those qualities of matter which come within the province of physical and chemical science.⁷ As a speculation it may be allowed, in so far as it puts within the original matter all that one wants to have there in order to escape from the difficulties of the bare mechanical hypothesis. It keeps in line with the principle of Continuity, and harmonizes with Descartes’ doctrine of Continuous Creation. The far-seeing wisdom and wondrous power implied in such an original constitution of matter, thus creating a complicated organic and inorganic world in germ, might possibly satisfy those who otherwise would prefer the hypothesis of separate origination later on in the world’s history, because of its being accordant with their ideas of wisdom and power. In Germany and in England this hypothesis finds

⁶ *Metaphysics*, book ii., chapter viii., section 229. Cf. section 230-233.

⁷ Something of this kind was the theory known as the *Animist* advocated by Stahl; and, also, I may include the more recent supposition of Haeckel that all matter is *beseelt*, though he can give no rational account of its origin in that wondrously-endowed condition.

distinct support, though the late Clarke Maxwell, in an excellent monograph⁸ on the subject, felt compelled from his position as a physicist, to regard it as a speculation not in anyway sustained by our actual knowledge of the behaviour of molecules.

Another solution of this class is that associated with the name of Leibnitz. According to him the clue to the existence of Life, as also to Thought, is to be found in the original constitution of the universe. Resolved into the last analysis all things are monads—units of being. These ultimate monads vary in their power. Their essential nature is activity, or as we in modern phrase would say, using the term generally, energy. The variation of their power is a variation in degree of perception. The lowest kind of monads are those whose perceptive activity is at zero; their sensitiveness is practically *nil*. An organism is a congeries of monads forming system within system. Every portion of what we call matter is a combination virtually of lives in their most infinitesimal form. "Every portion of matter," he says, "may be conceived as a garden full of plants, and as a pool stocked with fish. Moreover every branch of the plant, and every part (*membre*) of the animal, and every drop of the liquid in the pool is, also, such a garden, and such a pool. . . . There is nothing crude, sterile, or dead, in the universe; no chaos, no confusion, save in appearance. . . . Thus it is that each living organism has a dominant entelechie (monad) which is the soul in the animal, and also that each of its limbs is full of other living things, plants and animals, every one of which also has its dominant entelechie (monad) or soul."⁹ Taking such a view of the original constitution of things, and holding, as he did, the principle of Continuity, long before it was formulated by Sir W. Grove, he regarded the beginning of Life, in the first instance, as the emergence into organic form of sensitive units that contributed each its part to the ordered action of a particular system.

Such a speculation seems to recognise creation, in the strict sense, as once for all in the beginning of all things, and all afterwards as the continuous modification of the relation of the constituents of the universe. In such a case, Life in organisms would indeed be a "coordination of actions," only the actions

⁸ See *Life*.

⁹ *Monadologie*, Paris edition, pp. 67-70.

would be those of units whose characteristic was perceptive activity more or less clear. The beginning of what we ordinarily call Life would be the emergence of the first and simplest aggregation of units endowed with more perceptive activity than others that had previously been aggregated; or the first combination, into simplest coordination, of the smallest number of units requisite to form a distinctly sensitive system.

The speculation of Leibnitz may be left as food for speculative intellects; though I believe it to embody some profound philosophic conceptions.

There is only one other solution tentatively put forward in modern times to which I need refer; it is that worked out in such an interesting way by Professors Stewart and Tait in their combined production, entitled *The Unseen Universe*. Holding rigidly to the principle of Continuity in its utmost logical application; recognizing in organic structures the working of physical and chemical laws as surely and comprehensively as in the inorganic, they first of all reason up from the admitted data of physical science to the existence of an unseen universe, of which the present visible universe is the evolved outcome—believing that to be the true logic of scientific knowledge. The visible universe expresses, and is the form of, the energy that was in its antecedent Unseen Universe, but not *all* that was in the Unseen. In the Unseen Universe there was one form of energy which found its outlet in what we now know as the material visible system; and there was another “agency” which did not so find an outlet. This latter something is Life; and as the visible material world, and all that physically enters into organisms, as mere material structures, are the outcome of the one form of energy, so Life in organisms, regarded as the mysterious strategist that seems to direct and regulate all in an organism, is the outcome of that other form of energy—the Life in the unseen. All things alike are originally from the Absolute along a line of vast recession; but one line of things—the material, the visible—comes from the Absolute by means of an unseen intermediary operating in the unseen; and the other line of things—the living—comes from the Absolute by means of an unseen intermediary operating, also, in the unseen, and designated Life. Thus, just as now, Life only comes from Life, so, in the first appearance of Life on the globe, it came from the Life in and of the unseen. Thus the principle

of Continuity, and the law of Life from Life—scientific doctrines, are adhered to in the first emergence of Life.

Such an hypothesis as this is certainly so far valuable in that it adheres to the two admitted scientific doctrines, and also is in harmony with the impression given by vital phenomena, that in what we call Life there is something beyond the mere molecular co-ordination and mechanical interaction—a co-ordinating strategist.

Hitherto I have spoken only of Life. It now remains to say a few words in reference to the emergence of Consciousness. The two are intimately connected, and it will depend largely on the views we entertain concerning their connection, as to the explanation possible of the origin of Consciousness. The term Consciousness is very ambiguous. As used by Sir William Hamilton, it refers to the knowledge we have, that the Ego exists in some determinate state.¹ It is, he says, strictly undefinable; whereas his predecessor, Reid,² employed it in the sense of a faculty which had internal states for its object. With most modern Psychologists it is taken as the ultimate appeal as to the existence of a state of mind or the reality of an object, and it is even now and then used as the equivalent of assured personality. On the other hand, Kant regarded it as the phenomenal form of that *noumenon* which is the undiscernible unity of all we know in mind. If at the present time we were concerned only with Consciousness as thus understood in certain schools of Psychology and Philosophy, we should have only to study human beings, and ascertain the conditions and causes of the emergence of Consciousness so understood in them. But using the term in its relation to Life, in the widest sense of the word "Life," our definition or description of it must be of wider range. If Life be regarded simply as the Organic in contradistinction from the Inorganic, then, in contradistinction from Life, Consciousness must embrace all that comes under the name of "Sensation" or "Feeling," in whatever degree it exist, and whether in the highest or the lowest of the Animal Kingdom. No doubt it would be easier, for purposes of scientific and popular treatment, to deal with the striking contrasts apparent between organic structures as living things capable of growth, nutrition, and reproduction, and what is known as human Consciousness; but that

¹ *Metaphysics*, i. pp. 182–191.

² *Works* (Hamilton's Ed.), pp. 222–442.

would leave out of the discussion those elementary states in the lowliest animals which, whether called sentiency or feeling, are, in their essential features, like unto the fundamental states in the human mind, out of which the higher forms of Consciousness are believed by many to arise. Indeed, our more modern systems of Psychology are to be widely distinguished from the same science as it was treated by the Scotch School, of which Hamilton and Reid may be regarded as the types. The Physiological aspects of mental life are more insisted on, and the full Consciousness of the elder school is, by the application of an analytic process, exhibited as being an evolution from states of feeling as elementary as those which are found in animals far below man in ordinal rank. I do not mean to say that the interpretation of Mind by the Associationist School is in all respects to be taken as adequate—far otherwise; but as a matter of fact it does regard our highest forms of thought—intuitions, beliefs, and self-consciousness—as a growth out of prior and more simple elements. In fact, the generic term “feeling” is employed, for instance, by Mr. Spencer, to indicate that elementary state of bare sentiency which, by its integrations and differentiations, makes up the “Composition of Mind” much in the same way as the units of matter by their integrations and differentiations, in due course, evolve into the Material Cosmos. If then we would really get at the origin of Consciousness in the wider sense of the term, we shall have to ascertain, if possible, whence came that in organic beings generally which constitutes them not merely *living* but also *sentient* beings. The origin of Man as a Free Moral Ego is another question, though some would affirm that that, on principles of Evolution, is merged in this.

In dealing with the question before us we must remember that, according to our modern Psychology and Physiology, the actual existence of feeling or sentiency in a living creature is conditioned by the presence in the organism of a nervous system, developed in a degree proportionate to the intensity and frequency of the feeling experienced. I know that among eminent Physiologists there are differences of judgment on this point. There is also a school of psychical enquirers who are making it a special study to trace out the earliest signs of psychical life, which, I suppose, would be the most elementary form of consciousness. Some make out that traces of such life in simplest form of Memory begin first with the echinoderms, while the primary instincts appear with the

larvæ of insects and the annelids, and so on upwards till reason appears in the higher Crustaceans. Others make out that psychical life begins even with living Protoplasm. So that the general proposition of these various enquirers would be that in the lowest organisms, in which there is no sign of an elementary ganglion, there are evidences of some degree of sensibility.³ Be that as it may, the general truth is, that distinct unquestionable sensation implies some nervous arrangement; and the manifoldness of the sensational experience will be determined chiefly by the degree to which the nerve processes are developed. Any supposed sensibility in organisms destitute of distinct nervous structure is to be explained on the same principle; *i.e.*, there is, in such cases, an incipient nerve—a condition of organic matter tending to definite structure as nerve cell.

Now, what is important for us to notice is this, that feeling, sentiency, psychical Life, or whatever word is used to indicate the thing so well known, denotes something *sui generis*. The most elementary feeling in an organism is not a motion, not a molecule, not a mechanical or chemical relation between molecules, not anything that constitutes the organism a physical thing. In its essential nature it is as different as is our sense of Free Personality. Mr. Spencer admits that the difference between this subjective thing and the objective material transcends all differences known to us. The more we look into the question the more we shall perceive that between the material organism as such, its motions and molecular modifications, on the one side, and the most elementary feeling, on the other, there is an impassible gulf. No tests applied to the one will avail for the other. No terms to express the one will serve to express the other. That, I say, is the great fact which has to be accounted for, if possible. Whence came this strange visitor in a physical universe? And yet there is one other fact connected with it almost as remarkable. It is this, that this strange elementary consciousness appeared for the first time in the history of the world millions and millions of years after the physical system had been in existence and in process of development. After ages of molecular interaction, and, according to some authorities, after Life as an organic form of matter had

³ Cf. *Psychic Life of Micro-organisms*, by A. BINET; and *Psychophysiologische Protisten Studien*, by Max Verworm. There is a good English rendering of Binet's work published in Chicago.

long been in existence, this elementary consciousness emerged. Whence?

Now in reply to this enquiry I will first notice a few of the answers given by Philosophy or Science.

The Monadal Philosophy of Leibnitz solves the problem by the hypothesis that the original Monads which enter into the constitution of all things were by nature perceptive activities, more or less distinct, and in due course of evolution, therefore, *feeling* first, in most simple, and, then, in more elaborate, forms would arise. This, of course, is logical, and stands or falls with the prior conception as to the original units of being.

The hypothesis of the Animists, who regard all the units of matter as endowed with a *non-material* property, solves the problem by the supposition that at a certain stage in the evolution of the original atoms this *non-material* property asserted its presence—came, as it were, to the surface. Here again the solution is logical. It spiritualizes matter in the first instance, and so sees in its later development signs of the hitherto hidden property. No disproof of this position is possible. All we can do is to admit or deny the original assumption; though, as Clarke Maxwell intimates, all that physicists know of the behaviour of molecules goes against its truth.

The speculation of Professors Stewart and Tait, as unfolded in their joint work, *The Unseen Universe*,⁴ seeks to solve the problem by taking an exceedingly comprehensive view of the term Life. I have already pointed out that, according to them, the potentiality of all that now is in the visible universe, whether material or otherwise, was in the pre-existing Unseen Universe, from which the visible is an evolution. There was in the "Unseen" one potentiality which stood in direct relation to all that we cover by the word Life; and as, in their view, Life embraces more than the physical processes of growth, nutrition, and reproduction, so in the "Unseen" there was that which contained within itself an element answering to the psychical character we recognize in living things. According to this, then, Consciousness in some germinal form would inhere in the lowliest forms of life, and would spring, not from the molecular interaction of the organism as the mechanical school maintain, but would be an Evolution from some thing, not some things, of the same generic character existing previously before

⁴ Sections 214-216; 224-236.

molecules came into existence. Such a theory may be held, but cannot be proved or disproved.

The Mechanical School find in the Emergence of Consciousness their *crux*. Büchner and a few of his hardy followers make use of some strong phrases to indicate that all that we include under the term is the sole and natural product of the bare interaction of atoms. "*Ohne Phosphor ohne Gedank*" is, being only a partial truth, intended to imply that Consciousness is the absolute product of Matter as truly and in the same sense as bile is a secretion of the liver—a conclusion that ignores the essential difference between the most elementary form of Consciousness and the atom or its motions. To say that atoms by kicking one against the other, and so producing motions and concussions and adhesions, produce thereby also Thought or Sensation, which are neither atom, nor motion, nor interaction of atoms, but something which exhibits no single material quality, which lies beyond all material tests, affinities, and conceptions, is in reality to represent atomic matter as originating something utterly new, something outside the material sphere; it is, in short, to invest atomic matter with absolute creative power. Whatever may be urged in favour of the mechanical evolution of living organisms regarded as structures of matter capable of nutrition, growth, and reproduction, the argument utterly breaks down when the origin of Consciousness is to be accounted for.

Although Mr. Spencer's view of the universe is based on principles wider in range and more congruous with the facts to be solved than what can be affirmed of Materialism, yet among the minor considerations that have influenced him in his emphatic rejection of it must doubtless be included its utter inadequacy, in his judgment, to solve the problem before us. Amidst all his fondness for wide and frequent generalization, and in spite of the unfortunate complication and obscurity produced by his varying use of such terms as "Force" and "Nexus," his main lines of thought are clear enough to one who has patience to read his works with care. His solution of the problem before us comes out incidentally in the unfolding of his theory of Evolution. He proceeds on ontological lines in his interpretation of the phenomena of the universe, which for the purposes of his philosophy he divides into two parts—material and psychical. At the back of each, and as cause of each, there is one and the same Eternal Reality. They

are the two-faced manifestation of the Eternal Power, immanent in all things, and yet transcending all things. The psychical element in all lives—Consciousness—owes, then, its origin to the Supreme Source of all that is, only, be it observed, the manifestation of the Eternal Power in the form of Consciousness—*i.e.* the emergence of Consciousness—was late in time in comparison with the manifestation in form of material atoms and their interactions. Only when the material evolution had reached a certain stage, the Organic, did the Eternal express itself in this more spiritual form.

Now, such a view, considered in relation to actual facts, has this in its favour, that all the scientific evidence at our disposal does point to the Emergence of Consciousness as a strictly new event in the course of the changes undergone by the Universe. Though he shuns the term, it was, in fact, the Creation of a new factor to enter upon a course of evolution correlated with the material evolution already in progress. It is significant that the outworking of his comprehensive philosophy should have led Mr. Spencer to a position with respect to the *emergence of Consciousness in time*, when the prior evolution of things had prepared conditions for its operation, which, as to the principal point at issue, brings him into line with others who may differ from him in respect to some aspects of his system. I may add that, although Lotze arrives at his own conclusion,⁵ and the terms in which it is expressed are very different from those adopted by Mr. Spencer, the substance is the same; namely, that the Supreme Source of all did, without dislocating or impairing the existing material system in process of evolution, somehow introduce into correlation with the Organic order, the higher factor of being which, whether as feeling, sensation, or thought, or Consciousness, we all recognize as practically Soul or Mind. The position of the first elementary Consciousness in a Scientific Psychology is one thing, on which much difference of judgment may arise; its emergence in the first instance, in the course of a material evolution, as an act—it may be an ordered act—by the Author of all things is the point of present agreement.

I have thus endeavoured to lay before you the various leading solutions that have been proposed of a very important and difficult problem. I know not what general impression may have

⁵ *Metaphysics*, book iii. 1.

been produced by the discussion. Possibly it may be thought that both Philosophy and Science are doubtful oracles, and that "the wise man" is, as an ancient writer said, "no better than the fool." Yet surely it cannot be without intellectual and moral advantage to be brought face to face with some of the great problems pertaining to our existence. There is a gain even in knowing our own ignorance, and especially in an intelligent view of the conditions that circumscribe the acquisition of knowledge. The survey we have taken, though necessarily brief and imperfect, may serve the important purpose of opening up distant vistas of thought along which we may in days to come be induced to travel; it may exalt our estimate of the daring and persistence of the human intellect that seems to leave no hidden corner, and no tangled intricacy of thought and fact, unscrutinized; and it may deepen our humility and reverence by causing us to feel how vast is the mystery connected with our own existence. Coming here as we do from our respective daily occupations and professions in which, from the sheer force of habit, we are prone to allow our thoughts to move tamely and unvaryingly along one contracted groove, it may be that a reminder of the intellectual aspirations and the strong thinkings of others whose faculties go out into the mighty courses of Nature, and the vision thus brought us of far-reaching ideas, unlike those of our daily routine, may be to our life what the fresh moorland breeze, and the distant view of rolling hill and dale, are to the jaded toiler who for a while escapes from his common round of duties. There is in life surely something more than meat, and more than raiment. And whether we can solve the question of Life and Consciousness and their origin or not, I am sure we cannot have traversed the field of thought just now passed without, on the one hand, having felt a longing to bring our intelligence more fully into a line with the ever advancing thought of the age, and, on the other hand, cherishing profound respect for men of all schools who have laboured hard, it may be successfully or unsuccessfully, to swell the sum of human knowledge, and, who, by their failures as well as by their triumphs, have taught us what carefulness, what patience, what pure love of truth are needful, if we for ourselves would ever get an insight into the secrets of Nature, and form a rational estimate of the system of things of which we form a part. It is true life has its sorrows and its joys, but a wise Providence is surely leading it on

to a higher and more wondrous development. It is for us to fall in with the nobler course of things, and contribute our humble part of knowledge and motive to the enrichment of our social and intellectual being—not afraid of questions that tax our utmost penetration, while giving heed to those of easy solution—in all things exercising the Charity that is lovely to behold, and blessed to cherish. We may often feel in our sobered heart that Life, with its struggling consciousness of good and ill, is indeed a mystery in itself, and that its origin to the purely scientific eye is hard to discern, and its right maintenance and guidance very difficult; yet we may ever remember and act under the conviction that the practical solution of the mystery lies for us, as living beings, in thinking right, feeling right, and doing right, under the leading of such light as may shine on our pathway.

CONVERSAZIONE.

(3rd October, 1889.)

An account of this will be found among the Reports.

ON THE MONUMENTS AND MONUMENTAL ARTS OF THE ANCIENT EGYPTIANS.

SYLLABUS OF LECTURE BY MR. ROBERT MURRAY.

(Read 17th October, 1889.)

THE peculiar features of Egyptian art ; its antiquity and exclusiveness. The comparative age of the principal monuments extant. A detailed description of the most remarkable and characteristic remains in the Nile valley. Pyramids, temples, palaces, and tombs ; their characteristic features and decorative peculiarities. Some of the domestic arts known to the ancient Egyptians. Hieroglyphics and their interpretation. The art of embalming. Description of a visit to the Theban mummy-pits.

The lecture was illustrated by photographs, etc., chiefly taken by the lecturer, and exhibited by the lime-light lantern.

THE RISE OF ENGLISH ENGRAVING.

SYLLABUS OF LECTURE BY MR. ROBERT BURNARD.

(Read 24th October, 1889.)

BEGINNINGS of the art in England. Sketch of Continental art in the fifteenth century. The arrival in England of the De Passes, Hollar, and others. The engravings of William Faithorne the elder. The process of mezzotinto engraving ; its invention by Von Siegen ; adoption by Prince Rupert, William Sherwin, Francis Place, and others. Description of the works of the various artists who flourished up to the advent of William Hogarth. Consideration of the value of old prints. The decline and gradual extinction of line engraving. Brief reference to photographic processes for the cheap reproduction of pictures and works of art. The print-room of the British Museum.

The lecture was illustrated by photographs of engravings, thrown upon the screen by the lime-light lantern.

SOME OF OUR PLYMOUTH SEAWEEDS.

BY MR. G. C. BIGNELL, F.E.S.

(Read 31st October, 1889.)

AFTER an account of the reproduction and distribution of seaweeds, the lecturer gave a short description of, or made observations on, specimens exhibited by means of the lime-light lantern.

THE FORMATION OF LOCAL VARIETIES OF A SPECIES.

BY MR. W. F. R. WELDON, M.A.

(Read 7th November, 1889.)

THE lecturer considered the formation of local varieties of a species, and the way in which our knowledge of the variations of individuals bears upon the mode of formation of such local varieties. This question was illustrated by a short account of the variability of certain fishes and crustacea.

LAND TRANSFER.

SYLLABUS OF LECTURE BY MR. J. Y. WOOLLCOMBE.

(Read 14th November, 1889.)

SCOPE of paper. Sketch of changes in method of transfer from time of Edward I. Present system. Suggestions for improving present system. Registration as an alternative. Reasons for the failure hitherto of registration in this country. Requirements. Simplicity and consequent cheapness. Certainty. How far registration provides these. Miscellaneous points. Compulsion. Publicity. Guaranteed or indefeasible title. Boundaries. Insurance fund.

PLYMOUTH'S POSITION IN THE HISTORY OF THE WORLD.

SYLLABUS OF LECTURE BY REV. W. S. LACH-SZYRMA, M.A.

(Read 21st November, 1889.)

1. Introduction. Historic towns. The world's great ports. Plymouth and Genoa. 2. The early tin trade. 3. Middle ages. 4. Edward the Black Prince. The age of Cressy and Poitiers. Importance of England under Edward III. 5. "The sea-dogs" of Plymouth and other western ports. Voyages of discovery. 6. Armada days. 7. Influence of Plymouth after the Armada.

WOMAN SUFFRAGE.

SYLLABUS OF LECTURE BY REV. F. E. ANTHONY, M.A.

(Read 28th November, 1889.)

THE subject discussed on the ground of Right, and on the ground of Expediency.

Enquire: I. As to the *right* of women to the suffrage. Three arguments examined: (1) Women own and occupy property. (2) Women pay rates and taxes. (3) Women are interested in the results of legislation. Query interposed: Should *all women* have the suffrage?

II. As to the *expediency* of woman having the suffrage. Tested by the following considerations: (1) The probable entrance of women into public life. (2) The ability of women to meet the demands made on citizens as such. (3) The effect of the possession of the suffrage on women in their relation to men. (4) Its effect on the social position of women. Conclusion.

BI-METALLISM.

SYLLABUS OF LECTURE BY MR. C. F. BURNARD.

(Read 5th December, 1889.)

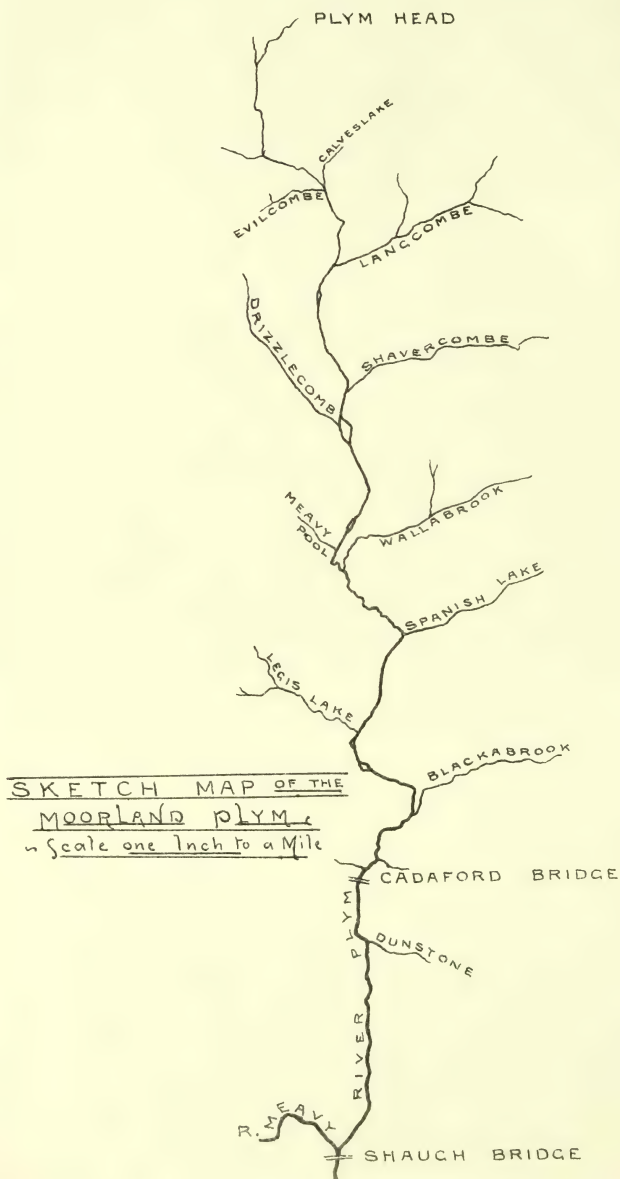
DEFINITION of "Money." Functions of Money. Currency of the principal trading nations of Europe. How England came to have a gold currency. Superiority of gold over silver as a standard of value. "Supply of Money." Recent adoption of gold currency as the standard of value by Germany, France, and other countries. Definition of Bi-metallism. Conditions necessary to adoption thereof. Arguments for Bi-metallism examined. Enquiry as to prices. Altered conditions of trading. Causes of the lowering of the value of silver. Enquiry as to the influence, if any, on the prices of commodities by the fall in the gold price of silver. Influence of this fall on our trade with silver-using countries. Some considerations on paper money, and by what means it might be made more useful in substitution of metallic money. Opinion of the philosopher Locke. Conclusion.

THE FLIGHT OF BIRDS.

SYLLABUS OF LECTURE BY MR. F. H. BALKWILL.

(Read 12th December, 1889.)

DERIVATION of birds from reptiles. Archeopteryx. Description of wing and tail of birds. Varieties of flight. Flight by burrowing. Flight by flitting or swinging. Flight by flapping or rowing. Flight by skating. Flight by sailing or soaring. Physics of flight. Monsieur Murey's instantaneous photographs of birds in flight. Conclusion.



THE MOORLAND PLYM.

BY MR. R. HANSFORD WORTH, C.E.

(Read 19th December, 1889.)

INTRODUCTION.

DARTMOOR is to-day a survival from the past, and bears upon its surface undisturbed the relics of an early civilization long since superseded.

Although at present a practically uninhabited waste, its population in Keltic and pre-Keltic times must have been considerable; perhaps, even, its hill slopes were preferred to the more sheltered but less open lower lands.

As agriculture advanced, the slopes of Dartmoor suffered in competition with more fertile valleys, and thus the greater part of its surface has remained undisturbed since an early period.

Although destitute of agricultural advantages, the valleys of Dartmoor were rich in tin; and the presence of this metal continued, within the last few centuries, to draw and retain a considerable population on the Moor.

Fortunately, however, tin-streaming from its nature is not a work which destroys all traces of previous occupation; and thus the remains now to be found extend from a very early to a comparatively recent date.

Though never seriously threatened by cultivation, Dartmoor has suffered much at the hands of unauthorized prophets. It is strange that so many poets who have undertaken descriptions of the Moor seem to have considered that cultivation would be a great improvement on the present state of affairs; and in several cases the wish has been the father of thoughts such as are expressed in the following lines:

“Yes, let the waste lift up the exulting voice!
Let the far-reaching solitude rejoice!
And thou, lone Moor! where no blithe reaper’s song
E’er lightly sped the summer hours along,

Bid thy wild rivers, from each mountain source,
Rushing in joy, make music on their course !
Thou, whose sole records of existence mark
The scene of barbarous rites, in ages dark,
And of some nameless combat ; hope's bright eye
Beams o'er thee in the light of prophecy !
Yet shalt thou smile, by busy culture drest,
And the rich harvest wave upon thy breast !
Yet shall thy cottage smoke, at dewy morn,
Rise, in blue wreaths, above the flowering thorn ;
And, midst thy hamlet shades, the embosomed spire
Catch from deep-kindling heavens their earliest fire."

These lines, written by Mrs. Hemans, obtained a prize, not from an agricultural association, but from a society formed with the ostensible purpose of cultivating literature and art.

This evening, however, we are more interested with the past and present of the Moor than with predictions as to its future.

BOUNDARIES AND AREA.

The Moorland Plym, as I would define it, commences at the junction of the Plym and the Meavy at Shaugh Bridge, and ends at Plym Head. Its valley, including those of all tributary streams which join this length of river, is bounded by a line starting at Shaugh Bridge, and running thence up the ridge to Shaugh Beacon ; thence in a fairly straight line, but with a slight curve near Hawks Tor, to Blackaton Cross, and, passing through the big pond above Leemoor, to Shell Top.

At this point the boundary turns to pass over the high and swampy land midway between Erme Head and Shavercombe Head. From thence to Broad Rock the boundary of the Plym valley is identical with that of Shaugh parish, which it leaves at Broad Rock to sweep round Plym Head to Caters Beam. Returning on the north side of the river, through Eylesbarrow and past the disused tin mine, near the old blowing-house, through Whittenknowle Rocks, to the south of Gutter Tor, taking in with a sweep a large portion of Ringmoor, to Brisworthy Plantation, across Wigford Down to the top of Dewerstone Hill, and down the slope of this hill to Shaugh Bridge once more.

The boundary-line thus indicated is about fifteen and a half miles in length, and encloses an area of thirteen and a quarter square miles.

The actual length of the main river above Shaugh Bridge is seven and five-eighths miles, and the various tributary streams add as follows. On the south side :

Dunstone Brook	a quarter of a mile.
Blackabrook	seven-eighths of a mile.
Spanish Lake	three-quarters.
Hentor or Wallabrook	one and an eighth.
Shavercombe	one and three-sixteenths.
Langcombe Brook	one and a quarter.
Calveslake	one-eighth.

On the north side, starting as before from Shaugh Bridge :

Brisworthy Brook	three-eighths of a mile.
Legis Lake	three-quarters.
Meavy Pool	one-eighth.
Drizzlecombe	one mile.
Evilcombe	one-eighth.

And another a little above Evilcombe also one-eighth, making the total length of main tributary streams eight and one-sixteenth miles ; while the river and tributaries taken together amount to about fifteen and three-quarter miles.

In the foregoing list most streams worthy of the name have been included ; but in rough weather or flood-time the length would be considerably increased.

It will be seen that the southern tributaries not only outnumber, but are individually much larger than, the northern.

With the exception of a small portion of its course, near Ditsworthy, the river runs for almost its entire length through granitic formations ; but at Ditsworthy a patch of altered slate overlies the granite, and stretches across the valley.

SHAVERCOMBE.

Shavercombe brook, which joins the Plym near this point, runs for a considerable distance over a slate bed.

As a result the Shavercombe valley presents a singular contrast to the surrounding scenery. The stream has hollowed for itself a deep gorge with fairly precipitous sides, and terminating at its higher end in a cliff of slate rock about twenty feet high, over which in wet weather the brawling little torrent hurls itself impetuously, only to be received in the deep pool below ; here, after

tossing round with all the fury of unreasoning haste, it finally swirls about an old tree trunk, and tumbling over itself in anxiety to escape and impatience of delay, clatters under, over, and between the boulders down to the river.

But the streamlet enjoys as a monopoly the right to disturb the quiet of the little valley, and in this sheltered spot the strongest wind, blow it from what quarter it may, is only felt or heard in gentle sighs.

And hence some certain trees have planted themselves, and flourish exceedingly—a few oaks, a sycamore, a mountain ash—adventurous colonists, separated from their nearest fellows by some four or five miles or more. Yet no tree among them dare call his top branches his own; for no sooner may he push a few tentative shoots above the level of the enclosing gorge, than the wind straightway planes them off.

After this rude check of higher and more ambitious aspirations comes contentment perforce, and lively gratitude to the sheltering valley, which, not unmixed with an enlightened self-interest, stimulates to increased exertion in safer regions.

The sides of the valley are covered with fern and sedge, which here replace the heather and bracken, and even the rock is everywhere hidden by a rich layer of dark green moss, which shines in places with a bright and almost iridescent radiance, making still darker the velvet depth of its shadows.

Through the entrance to the valley, and in strong contrast to the immediate surroundings, one may catch a distant glimpse of brown and purple hillside. Altogether it is a spot such as the wildest imagination would never picture as existing among these bare and desert hills.

In referring to it I have been led to digress from the order which I had intended to follow, because its peculiarities seemed so intimately associated with the geology of the district.

SHAUGH BRIDGE AND DEWERSTONE VALLEY.

I now purpose taking you back to Shaugh Bridge, and working my way up stream, noting the points of interest on either side of the valley in the order of their geographical position. I have chosen this method in preference to any classification because I think it more natural, and better calculated to convey an accurate impression of the whole subject.

Shaugh Bridge is a comparatively modern structure, and some fifty or sixty years ago was considered to lack in picturesqueness, while the loss of the old bridge was much lamented. As a lesson to those who now grieve over the substitution of modern erections for ancient and picturesque structures, I would point to the present appearance of this bridge, and add that much comes to those who have the patience to wait fifty or sixty years for it.

A loss which cannot be remedied by time has of late years been caused by the destruction of many of the stepping-stones just above the bridge. This was done by the men working at the Ferroceramic mine, with a view to enabling them to exact toll from all persons wishing to cross the river, by forcing them to use the mine bridge. At least, that is the only reason that can be given for this wanton act of mischief.

From Shaugh Bridge to near Cadover the river bed is thickly strewn with boulders of large size, as are the precipitous hillsides enclosing it.

The Dewerstone hill in especial is mainly surfaced with granite blocks, piled in places one above the other in bare grey masses of confusion, in others deeper set in soil, and permitting the coppice of sturdy oak to obtain scant but sufficient holding ground.

From the midst of this thicket rises the perpendicular face of the Dewerstone, towering high above the river. Majestic rather from its form than from its actual height, which has been much exaggerated, one is still inclined to doubt the truth of tradition in asserting that on the night of the 27th January, 1823, the flooded Plym, indignant at this check to its triumphant course, flung the snow water in spray above the topmost crag. The idea is poetical truly, and inasmuch as the event occurred at night, it is hardly fair perhaps to be too severe in criticising the chroniclers. At least this much is certain, that the united forces of the Plym and Meavy filled old Shaugh Bridge to the keystone, and overflowed the road.

Beside the largest rock, this portion of the valley also includes the deepest and most important pool upon the upper Plym. It is situate in the north wood, and is of more interest to the fishermen than the general public. At its upper end the river runs into it over a wall of rock some twelve feet high, the main stream coming down in a body with only one slight ledge to break its fall halfway. Considering the difficulty of surmounting such

an obstacle, it is no wonder that the salmon and peel should pause for a time in the quiet depths of the great pool before hazarding an attempt.

The first stage of the ascent is sufficiently easy. Rising perpendicularly through a depth of twelve or thirteen feet, the athletic fish springs some four or five feet in the air, and descends on the first ledge. Exposed here to the full force of the falling water, the usual result is, that before recovery is possible the adventurous voyager is roughly hurled back into the depths below.

Nothing dismayed, attempt follows attempt, until at last some mysterious finhold is obtained upon the rock or water, and, half swimming, half leaping, with swift strokes of its powerful tail, the undaunted salmo literally scales the waterfall, and attains the pool above.

In flood-time lesser streamlets trickle over the surface of the rock, and by these peel, even as small as three-quarters of a pound in weight, contrive to ascend. There is no living creature that for pluck and perseverance can excel a salmon.

On the hills above the river are scattered some few remains of early habitation. On the plateau which extends to the north of Shaugh Beacon are a few hut-circles, which present no unusual features.

The summit of the Dewerstone hill has been fortified, as the foundations of many walls attest. Across the neck of land between this and Wigford Down a pair of walls some twelve feet apart are still traceable, and behind these the remains of another, which apparently once completely surrounded the summit of the hill.

On Wigford Down are a number of small cairns of stones, of which the origin and use cannot now be decided; possibly they may be sepulchral, possibly the result of some attempt to rid the land of rocks prior to cultivation. If the latter, then singularly unsuccessful; for in this land if you move one stone you merely disclose another. Excavation might settle the nature of these relics. Near the angle of Cadworthy Farm is a kistvaen, the cover-stone of which measures four feet by four feet, and still rests on one of the sides. A circle of about twenty feet diameter of large stones surrounds it, and near by, to the north, stand two more circles, in one of which are what may be the remains of another kistvaen, while the other is an undoubted hut-circle.

On the height of Wigford Down, which overlooks Cadover, are a group of remains. These consist of a kistvaen, the cover-stone of which has been removed, and now lies to one side, while the tomb itself has collapsed; around the kist is a circle twenty-four feet in diameter, the stones composing which are exceptionally large, the dimensions of one being nine feet by four feet by three feet.

About 150 yards to the north of this kistvaen, and on the highest point of the hill, is a confused mass of stones about seventy-two feet in diameter. This heap is now in too disturbed a state for any trace of its original arrangement to be discovered. Whether therefore it is merely the base of a cairn which has been robbed of the greater number of its stones, or of some chambered erection, it is impossible to say; but personally I incline to the latter theory.

To the west is an elliptical enclosure, 90 feet on the longer axis and 57 feet on the shorter. There are other less important remains in the immediate vicinity.

Walking toward Cadover Bridge we shall find two tumuli of small size, and near them an old cross set in a small artificial mound, with a trench dug round it. This cross had lain on the ground for many years, but was placed erect as we now find it by the soldiers, during the autumn manœuvres some years ago. (See figure 1.)

On the other side of the river, at the corner of Shaden Brake, where the field-path from Shaugh rejoins the Cadover road, is another old cross, which, less fortunate than the last, has fallen, not to be re-erected, but to be converted into one of the stepping-stones of a stile. It seems a pity to let it lie as it now is, especially as some years ago I found its socket on the slope of Hawks Tor, in the angle between the Cadover and Plympton roads. It would be a very small matter to carry this old cross back to its socket, and re-erect it.

CADOVER BRIDGE TO BLACKABROOK.

From Cadover Bridge to the Blackabrook the river runs in a wide, flat valley, very different to that portion of the course which we have just surveyed. The stream itself consists of alternate long, deep pools and sharp stickles, and not only the bed of the river, but the whole of the valley on this length, is almost entirely free from boulders.

The only antiquities of note are on the southern bank, and the first to which I shall refer lies, strictly speaking, just outside the Plym valley.

On the summit of Hawks Tor is a curious arrangement of rocks, claimed by some as natural, by others as artificial. The square jointing of the granite has left in the solid rock which crowns the tor a rectangular area, enclosed on three sides by granite walls formed in the living rock. So far, I believe, all agree in assigning this object a natural origin.

Over the area thus left in the rock extends a large, thin, flat slab, which is a separate block, and is not a part of the solid pile. This block forms, in fact, a roof to the chamber left by the jointing, and is the debatable point, it being argued on one side that it fell where it now lies without the assistance of man; while others hold that its position points to an artificial origin. The latter is, I think, the correct interpretation of the facts.

First as to the theory that it fell where it now lies. Being at the highest point of the rocks it had nowhere to fall from, except possibly the skies.

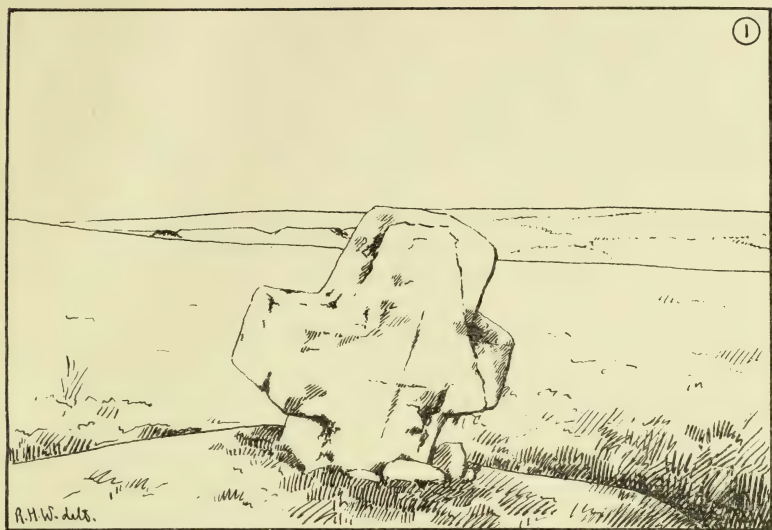
Admitting, however, its possible aerial origin, and that is admitting a great deal, there still remains what to my mind is absolute proof of man's assistance.

On the western side the granite wall enclosing the chamber is lower than on the eastern; and accordingly the slab, if rested directly on these, would be on an incline. To obviate this the western wall has been raised to a level with the eastern by the addition of a rounded granite boulder; and by resting on this, the surface of the slab is brought to a level. No more thoroughly artificial arrangement could be desired. It is a difficult matter to classify this antiquity—perhaps it might be called a cromlech. (See figure 2.)

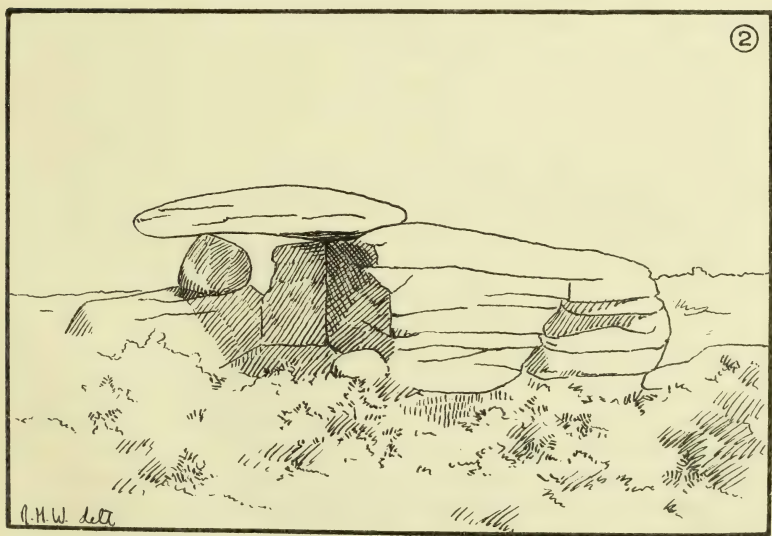
In the angle between the Shaugh and Leemoor roads at Cadover Bridge are the remains of two or three walled buildings, but their nature and use are now undiscoverable.

Just above the lower reservoir belonging to the Shaugh clay works are the remains of an old enclosure and several hut circles.

The enclosure is not strictly circular, but measures 232 feet on its north and south diameter, and thirty feet less, or 202 feet, from east to west. Within it are four hut-circles and the remains of an oval erection of similar nature.



CADOVER BRIDGE.



HAWK'S TOR.

The circles are all in the northern half of the enclosure, which touches the circumferences of three of them. These three are thirteen feet, thirteen feet, and fourteen feet in diameter respectively and are spaced exactly forty-six feet apart centre to centre. The fourth circle is twenty-six feet in diameter, and, unlike the others, does not touch the wall of the enclosure, but is seven feet off it.

The oval is twenty-four feet on its greater axis. The whole forms a good specimen of the ordinary enclosed villages, of which there are many in this valley. There is another smaller enclosure near.

We cross the Blackabrook by a clapper bridge of single span; and while walking up the eastern bank of this little brook we shall be able to observe evidences of the streaming industry, which are presented by artificial piles of stone, and the deep-cut gullies to be seen on either bank.

Resolutely keeping our eyes closed to all other objects of interest, we at length reach the head waters of the Blackabrook near the big pond at Leemoor.

By going back a little in our course we may inspect two objects which appeared against the sky line when we were in the valley below. These are Blackaton, or Roman Cross, and Emmett's Post, both close by the Leemoor road. The cross is at present about six feet in height; but prior to its restoration by Earl Morley was, I believe, much shorter. It has been suggested by several that it was once dedicated to St. Rumon, hence its name. (See figure 3.)

Emmett's Post at present seems decidedly modern; but that may possibly be due to some Vandal having split the stone, and carted off one half as a gate-post. It stands on a fair-sized tumulus, which at least looks ancient.

TROWLESWORTHY.

From this point can be seen the whole western side of Trowlesworthy Tor, which presents, possibly, more relics of past times to the antiquary than any other equal area on the Moor.

Between this hillside and Emmett's Post lies a fairly flat stretch of country, apparently destitute of trees, shrubs, or bushes of any sort; but in reality having many a willow hidden away in the deep pits left by the old miners.

The southernmost of the remains on Trowlesworthy is a stone avenue.

This avenue is 426 feet long, and consists at present of 114 stones, arranged for the most part in pairs; though in some places, where stones have been removed, standing singly. On an average there seem to have been, when the avenue was perfect, a pair of stones to each six feet in length; and the width, from out to out, is also six feet.

To the north this avenue terminates in a circle of twenty-three feet diameter, consisting of eight stones all standing, and averaging about three feet high.

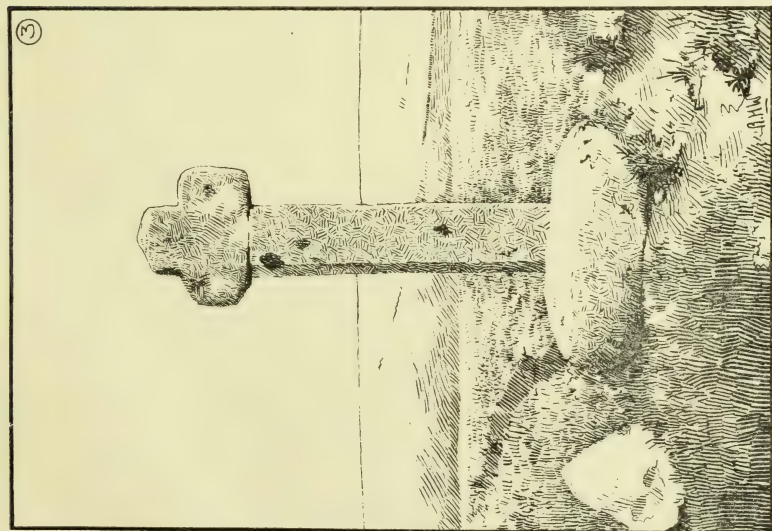
The stone in this circle which stands nearest the avenue is very curiously shapen. It is broad and flat, and near the base a V shaped piece has been chipped from either side, so as to give it a constricted appearance.

Its total height is 4ft. 9in.; its greatest width 1ft. 11in.; and its greatest thickness 7 inches. The girth at ground level is 5ft. 1in., and at the centre of its height it girths 4ft. 9in.; but at one foot from the ground, where it has been cut as I have described, it only girths 2ft. 10in. At what date or for what purpose this stone was thus cut it is impossible to determine. (See figure 4.)

A single pillar stands 112 feet from the south end of this avenue, and a little out of alignment with it. This has had a very narrow escape from being converted into a gate-post, as someone had already cut holes to lead in the lewis bolts, and then for an unknown reason failed to take the stone away.

The avenue runs nearly north and south, but with a slight tendency to the north-east and south-west. It is not, strictly speaking, straight, but curves at the middle of its course slightly to the east.

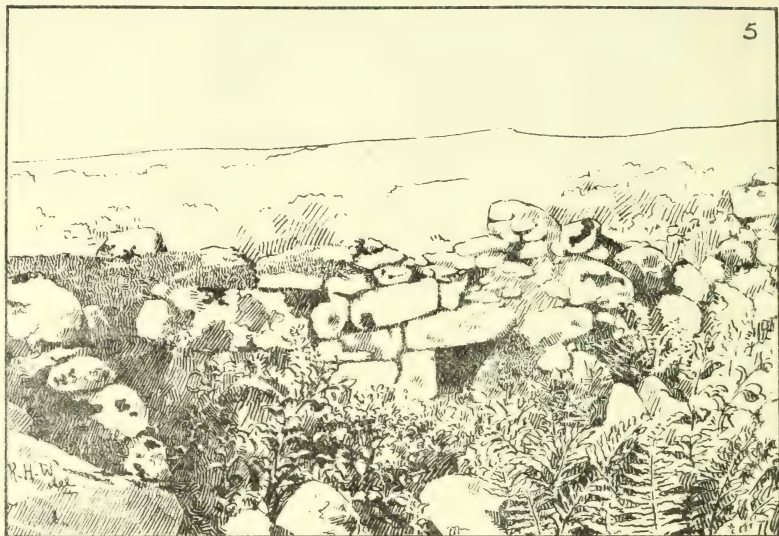
There is another avenue recorded by most observers, and marked on the Ordnance map. But this has always within my recollection been a single and not a double row of stones; and so far as can at present be ascertained it always has been single. No subsequent spoliation will account for the loss of the second row; for it is common experience that the best stones in both rows are usually removed, and not all on one side, as would have been the case in this instance. But the mistake of counting extraneous rocks on either side as fallen members of the avenue may easily have been made.



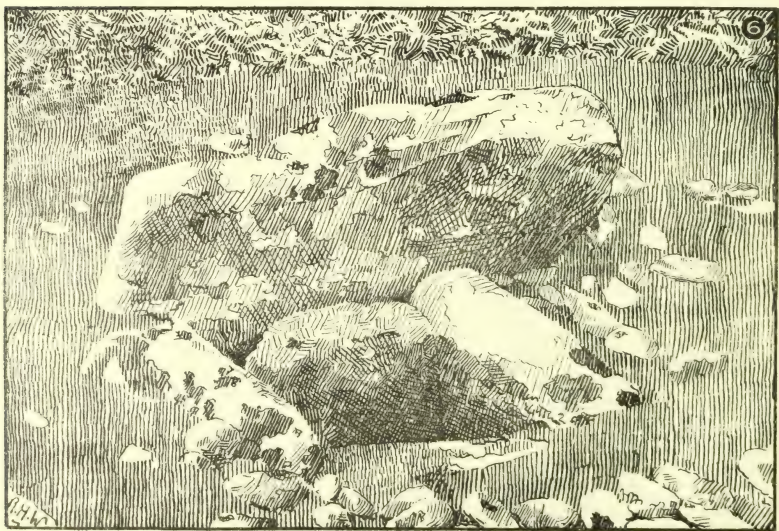
ROMAN CROSS.



TROWLESWORTHY.



HENTOR HOUSE.



DRIZZLECOMBE.

This single row is 254 feet long, and at present consists of thirty-eight stones. At its western end it terminates in a small *mênhir*, which stands four feet in height, and has a girth of eight feet at the base. For 160 feet from this point the row is fairly continuous, with only occasional short intervals where blocks have either been removed, or have fallen and been buried.

In this length there are thirty-one stones; and originally these were apparently spaced about five feet apart, centre to centre.

After this fairly perfect portion comes a gap of fifty-eight feet, and then the row recommences, and contains six more stones of a small size, and ends in another pillar of 3ft. 7in. in height, and 5ft. 8in. girth at base. This is a broad flat stone, and the last left standing of those forming a circle of about twenty feet diameter.

The whole has a bearing fifteen degrees south of east, magnetic, and points very nearly to the circle at the end of the avenue previously mentioned. It is not perfectly straight, but is slightly convex to the northwards. The angle between the directions of the avenue and row is seventy-five degrees, or over the fifth of a circle.

About 440 yards to the north are the ruins of a square building. The main block is thirty-four feet long by eighteen feet wide, and is divided by a stone partition into two compartments. The walls are uniformly three feet in thickness, and built of untrimmed granite blocks. There is a projection on the south side measuring eighteen feet by fourteen feet, and forming a porch. On the south-west corner of the main building a small shelter has been raised, but this is evidently a later erection. (See plan.)

The date of this building cannot be fixed with certainty, but from the style of the masonry, and the thickness of the walls, it should be early. Probably it was in use at the same time as at least some of the many hut-circles in the neighbourhood. At other points in the valley we shall find that we can trace the transition from round to square buildings, and from rough cyclopean masonry to more finished work, in which the stones have been squared and regularly bedded.

Some old enclosures in the immediate vicinity have been modified, apparently to suit the convenience of the owner of this house.

Near this building, and a little to the north of it, is a fortified enclosure, first noted, I believe, by the late Mr. Spence Bate, and

stated by him and subsequent observers to be unique. I have, however, found another, close by the square building just described, the entrances to which are defended in a precisely similar manner, and have observed modifications of this method of fortification at other points in the valley. I will deal more fully with these later on.

The enclosure in question is somewhat irregular in shape; its longest diameter measures about 240 feet, and runs from north to south along the hillside; its shorter is about 200 feet, and runs up the hillside. Within the enclosure are six hut-circles, varying from twenty-two feet diameter, the smallest, to forty-three feet, the diameter of the largest. (See plan.)

At the north and south ends entrances have been formed in the rampart, and these are protected by a curious arrangement of walls, designed evidently to prevent the sudden ingress of enemies. At the north entrance a cross has been built, athwart the gap in the main rampart, and, as you will see, any intruders would have to come singly, and would stand a fair chance of being knocked on the head by gentlemen posted within the inner angle. Mr. Spence Bate, in his sketch of this, showed an entrance also through the centre of the cross, but after careful examination I do not think this ever existed; and in the case of the other fortified enclosure near by, the centre of the cross remains intact at both entrances.

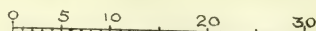
The southern entrance presents a somewhat more complicated arrangement. On the outside of the enclosure the walls are practically the same as those to the north, except that the presence of a large block, which offered a good foundation, has caused the eastern wing to be curved somewhat at its end.

But inside, in the place of the two arms of a cross, the circumference of a large hut-circle has been made do duty, and built out from the circle is a small square chamber very like a sentry-box, and probably used as such.

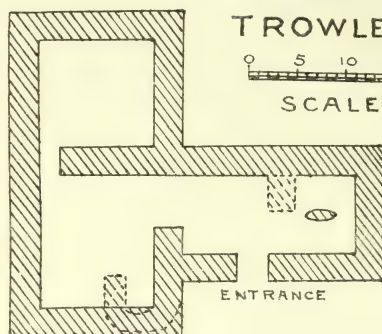
To the east the width of entrance left by this arrangement was still considerable, and accordingly a short wing, twenty feet long, was added to the main rampart, running parallel to the circumference of the hut-circle, and at a distance of 2ft. 6in. from it.

The other enclosure close by, of which the rampart is in places imperfect, has even more perfectly preserved entrances, but both of the simple cross type.

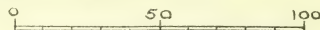
RUINED BUILDING TROWLESWORTHY



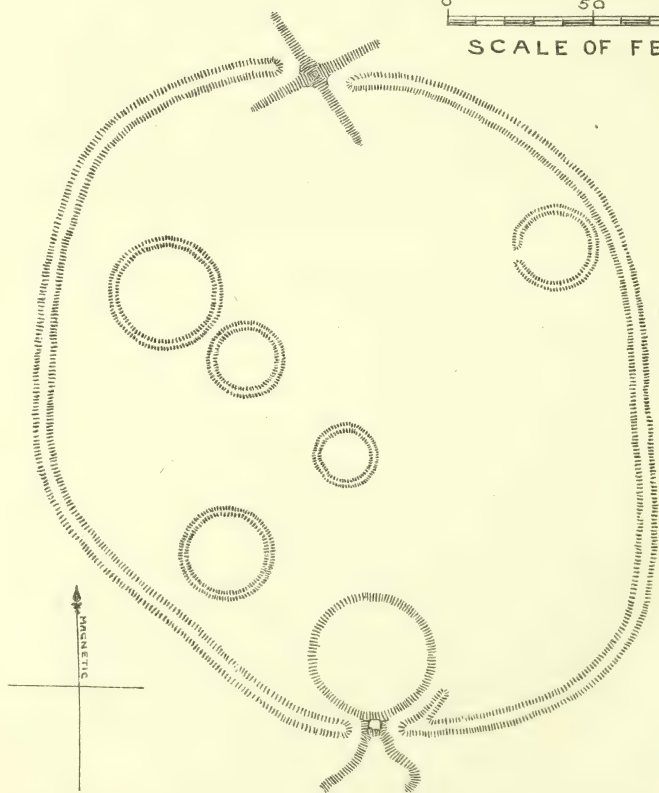
SCALE OF FEET.



FORTIFIED ENCLOSURE TROWLESWORTHY



SCALE OF FEET.



A little higher on the hill than this last, is a very fine hut-circle, forty feet in diameter, and built apparently partially on an artificial mound, raised to bring the floor level.

There are many hut-circles, and one or two enclosures of the ordinary type, in addition to those already described; and a little to the south of the old smithy is a wall apparently erected for purposes of fortification. (See figure A.)

On one side, the northern, this wall is practically level with the ground, but on the southern it rises with a perpendicular face from an artificial dyke, and, curiously enough, this face is not toward the side from which attack might be expected; on the contrary it is toward the huts and enclosures it seems designed to protect. There is a fortified entrance through this wall, and this being on the high side, also points to the somewhat unusual arrangement of an agger preceding the vallum. This wall runs east and west. Near Trowlesworthy house itself, in addition to many old field enclosures now fallen to ruin, there are the remains of two circular pounds, the one of seventy-four yards in diameter, and with two hut-circles in the centre, and the adjoining one somewhat smaller, with only one hut-circle of about twenty-four feet diameter in the centre. These may possibly represent the old Troule's *Weorthig*. On the other bank of the river, beside the large mounds left by the tin streamers, there are no objects of special interest.

BLACKABROOK TO LANGCOMBE.

From the junction of the Blackabrook upward, the valley of the Plym assumes a bolder character, and for the next mile or so of its course it runs between high banks, and over a bed thickly strewn with boulders.

A little below the Wallabrook the banks recede on either side, the valley widens, and the river, though still having a rapid fall, comes down through a narrow plain, and over an even bed.

At Ditsworthy House the valley narrows again, only to expand once more immediately above the weir pool, and here the southern bank still keeps bold. Above Drizzlecombe and Shavercombe the river enters a gorge, which extends beyond Langcombe.

In this gorge there used to stand, a few years back, a thorn-tree, dwarfed, stunted, and distorted out of all resemblance to most of

its kind, but yet a patriarch holding the post, no sinecure, of highest tree on the Plym valley.

As there was no straight piece of wood longer than two inches in the whole, and even as firewood it did not seem a profitable investment, there were hopes that it might long continue in its honoured position. But last winter it disappeared, and on examination of the spot I found it had been cut down ; by whom or for what possible reason I cannot ascertain. It seems a pity that some people will indulge in purposeless destruction.

RINGMOOR AND LEGIS TOR.

To return to the numerous antiquities we have passed in this hasty run up stream. The first to be noticed is a circle of stones on Ringmoor, which has been marked on the Ordnance map as a hut-circle, probably because it evidently is not one. It is seventy-five feet in diameter, and consisted of a number of upright stones, of which at present twenty-one can still be traced, spaced at some considerable distance apart, presenting, in fact, all the characteristics of the so-called "sacred circle." The stones average three feet high by two feet square.

At Trowlesworthy there yet remain to be noticed the fortifications which overlook Spanish Lake, and extend in a broken line from Shell Top to Great and Little Trowlesworthy Tors, and down to the river.

A wall extends from Little Trowlesworthy Tor in a northerly direction to the river, and has at several points openings which show in many cases signs of having once been fortified.

There is an outwork near the small stream known as Spanish Lake, and in a line between Hen Tor and Trowlesworthy, which presents some curious features. A clitter of rocks to a certain extent covers the best ford on this stream, where its high banks are merged in the flat tableland from which it rises. At this point a wall, of which I have placed a plan before you, has been built, so as to make use of and improve on the natural advantages of the place. (See figure B.) There is another outwork of similar character on Legis Tor, to which I shall refer later on.

The late Mr. Spence Bate mentions the ruins of a dismantled cromlech or kistvaen in this neighbourhood ; but I do not remember ever having observed it, and have not had time to make a special

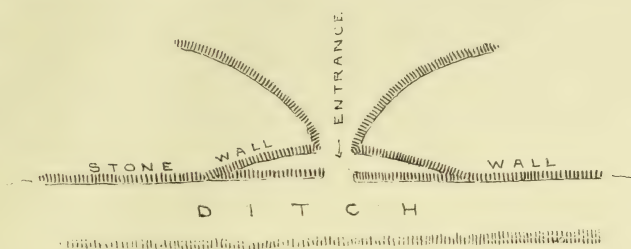


Fig. A.

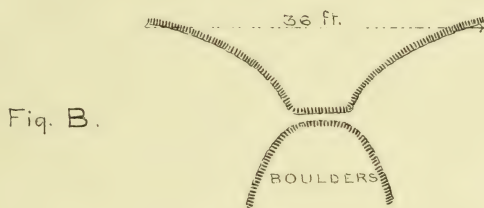


Fig. B.

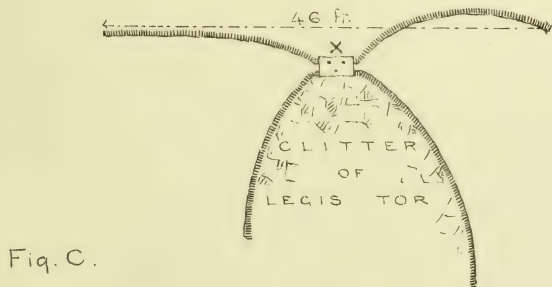
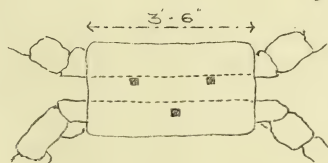


Fig. C.



DETAIL AT
.X.



Fig.D.



DRIZZLECOMBE.

search. With this we leave Trowlesworthy, which must at one time have been a veritable stronghold, and even now presents more signs of careful and elaborate fortification than any other district in the southern quarter of the Moor. What the reason might have been for such precautions we cannot now know.

The slopes of Legis Tor, on the northern bank, are thickly covered with hut-circles and enclosures, and probably once the population was equal to that on Trowlesworthy. But with the exception of one wall opposite Spanish Lake, and the summit of the tor itself, no efforts at exceptional fortification have been made.

I have prepared a rough plan of the arrangement at the summit of the tor. It will be seen that two of the wing walls embrace a natural pile of rock, and the others, diverging more widely, present an outer rampart. So far all is plain. But in the centre, where the four walls meet, a short channel, six inches wide by ten high, has been formed between two rows of granite stones, and covered in by a square stone 3 ft. 6 in. long and 2 ft. broad. And in this three square holes, each $1\frac{1}{2}$ by $1\frac{1}{2}$, by $2\frac{1}{2}$ or 3 inches deep, have been cut to form the points of a triangle, of which two sides are each 1 ft. and the third 1 ft. 7 in. in length. (See figure C.)

I confess I cannot imagine any possible use for all this, but have been led by a series of unfortunate circumstances to conclude that it is a taboo stone.

In the first place, when examining it, I am sorry to say I cut my hand; and secondly, when, having put my knife on the large block, after clearing out the holes with it, I turned my back for a moment, I never saw that knife again, and no amount of search would recover it. Finally, after taking a photograph of this unlucky spot, I discovered, when proceeding to develop it, that I had elaborately re-exposed an old negative. This series of disasters have left a lasting impression on my mind.

On this Tor there is an hitherto unrecorded kistvaen, the cover-stone of which measures 5 feet by 4 feet 1 inch. The sides have fallen in.

A wall which runs north and south from Spanish Lake presents an arrangement of demilunes and circles, evidently intended to protect the entrance. (See figure D.)

HEN TOR.

Crossing from this point to Hen Tor, we shall pass an enclosure with several hut-circles and one square chamber, the latter measuring fifteen feet by twenty-seven feet, and having walls three feet thick. There are no signs of a chimney or fire-place.

At Hen Tor itself there are traces of continuity of occupation from very early to comparatively recent times.

There are mingled hut-circles of varying construction, and the remains of two square buildings of differing types, one of which was last occupied about 120 years ago. Farm and field enclosures are involved with early pounds, and each succeeding generation has somewhat modified its predecessor's work to meet later necessities, this being more especially the case with the field enclosures.

Time will not permit a detailed description of all the remains on this hill.

From the quantity of stone used in their construction the huts would seem to have been of a domed form. In one there are signs of a recess or fire-place in the wall, and many have the door-jambs still standing.

Some four or five of the circles are in a row ; and the clutter of the tor behind them has been roughly arranged to form a series of walls extending up-hill in rear of each circle.

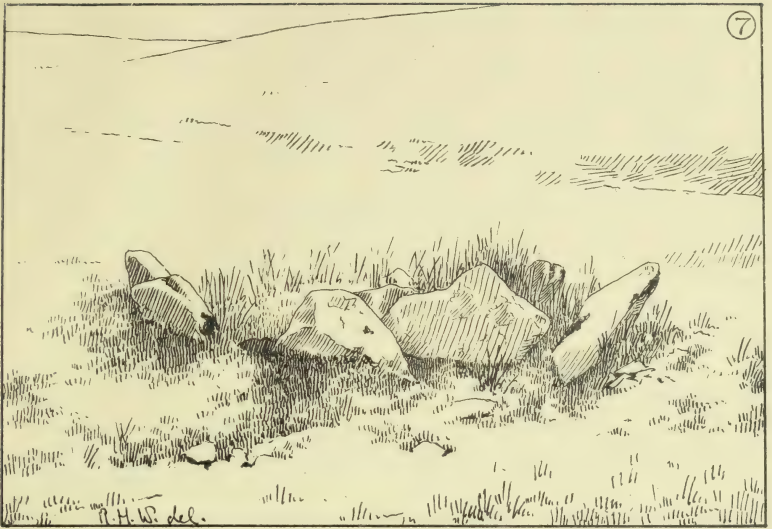
Of the earlier square building I will say no more than that its foundation plan is still complete.

The later building, which is known as Hentor House, has still some of its architectural features preserved.

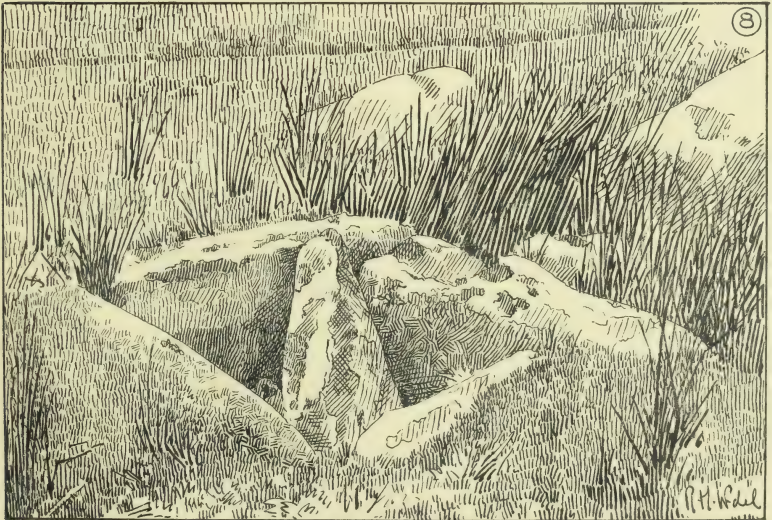
The masonry is of squared stone bedded in clay mortar, containing probably some lime. The earth used in making the mortar is not such as would be obtained in the immediate neighbourhood.

The main building measures 45ft. 4in. by 18ft. 6in., and is divided by a stone partition into two rooms. At one side is an outhouse, and on the northern end another outhouse has been added, the same width as the main building, and having a length of twenty-seven feet. In this latter is a shallow walled pit, apparently a well.

The walls are uniformly three feet thick ; and in those of the house itself niches have been left to act as cupboards. Several of these are still perfect, and it was only last year that one was destroyed. (See figure 5.)



GRIMSGROVE.



GRIMSGROVE.

Mr. Ware, of Ditsworthy Warren, and his son were netting rabbits, when one took refuge in one of these niches under a pile of stones. Mr. Ware the younger canvassed the situation, and being a man of practical tendencies proceeded to demolish the wall. Whereupon ensued the following conversation :

“ Why, Jack, what be about, a-knockin’ down Mother Nicholls’s book-place, man ? ”

But Jack the practical replied, “ Dang Mother Nicholls’s book-place ! I wants the rabbit.”

“ And so,” says old Mr. Ware, “ he knocked down the old place that had been standing ever since we came here, and that’s nine-and-fifty year ago.”

The last holder of this building and the farm attached was called Nicholls ; and an old man named Northmore, still living at Meavy at the age of ninety-two, remembers hearing from his father that his grandfather recollected Nicholls living at the house.

It is said that it took a team of ten oxen to plough the fields of Hen Tor.

Proceeding towards Shavercombe waterfall, we shall pass over comparatively level ground, on which, about 400 feet to the west of the Shavercombe brook and 900 feet above the waterfall, are the remains of a kistvaen, of which the cover-stone has been thrown on one side, while the kist itself has fallen in. A circle of stones surrounds the whole.

In the immediate vicinity are several hut-circles and an enclosure, all built in small slate stone, although granite was obtainable near at hand.

Below the waterfall, on the western side of the valley, is another enclosure built in granite, and surrounding a few hut-circles.

Crossing to the north side of the Plym by Ditsworthy dam, we pass the swamp known as Meavy Pool, and up the valley in which it lies, merely pausing to observe the great heaps thrown up by the streamers, and the remains of a reservoir which they once constructed near the head of their cutting. As no natural stream flows down the valley in ordinary weather a leat was led round from the main river.

And here I would observe that it was my original intention to include these old leats in my survey, but their number, and the necessity for curtailing my remarks, have led to their omission.

DRIZZLECOMBE.

Above this valley to the east are the heights of Eastern Tor and Whittenknowle.

On Eastern Tor a portion of the summit has been enclosed, while among Whittenknowle Rocks are scattered thickly, and apparently without order, the intermingled ruins of round huts and square buildings. This settlement in fact seems to represent a transition period; possibly, however, the square buildings may be comparatively recent, though this does not seem probable. They are of the rudest possible type, and vary from twenty feet long by fifteen broad to thirty feet by twenty.

This settlement overlooks the most important antiquities that will come under our notice this evening.

On the eastern side of the valley known as Drizzlecombe, which joins the main valley of the Plym just opposite Shavercombe, stands a group of remains hitherto, as far as I can discover, undescribed.

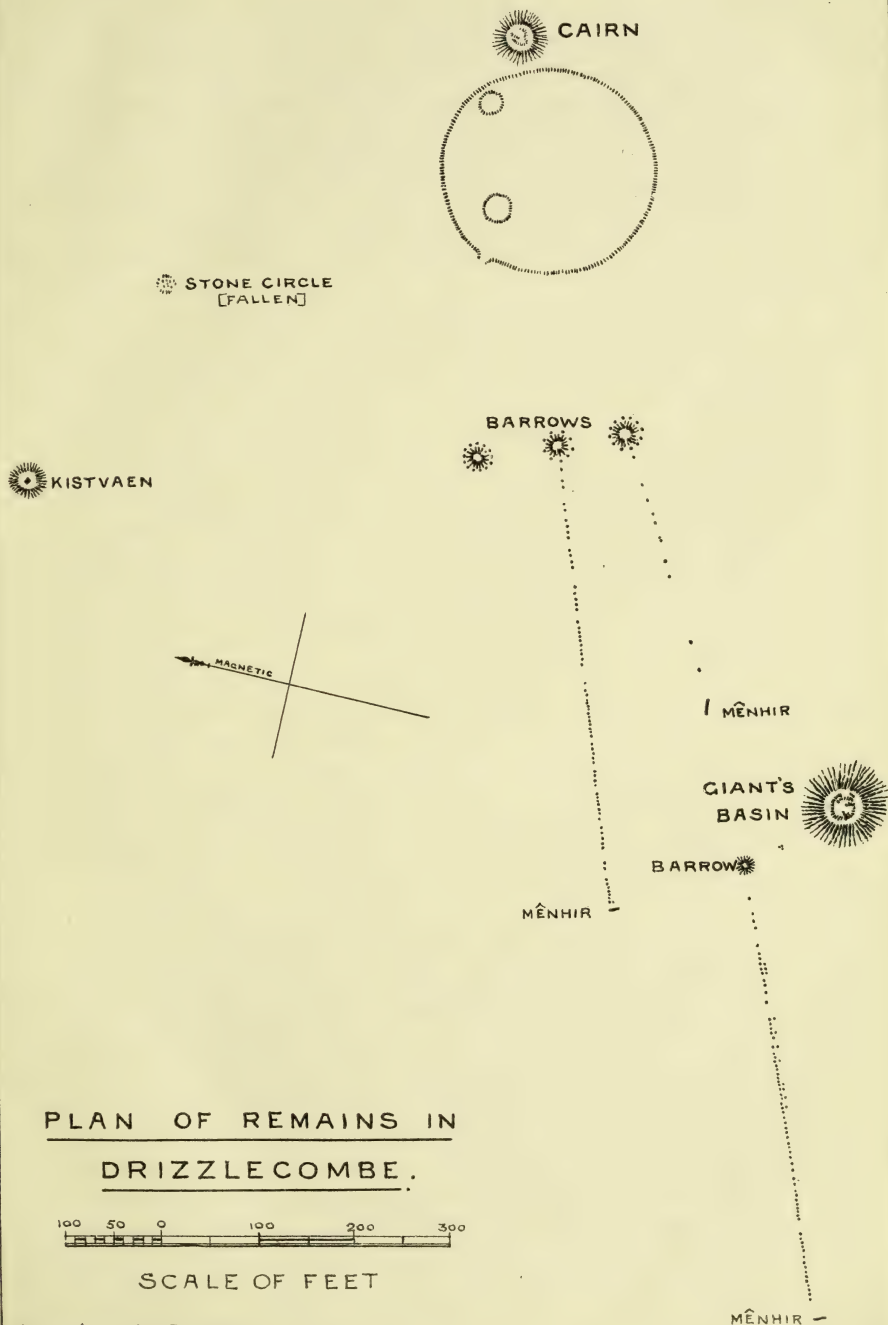
They consist of three long rows of stones, each terminated at one extremity by a fallen *mênhir*, and at the other by a barrow; associated with these are two large tumuli, and a large enclosure surrounding two hut-circles.

At a short distance to the north there is a very fine kistvaen, from which the cover-stone has been removed, and there are remains apparently of a stone row leading from this to a small circle of stones, standing and fallen, and probably surrounding another as yet unopened kist. Several other enclosures, all containing hut-circles, are to be found on the slope of this hill.

That all this should have hitherto been either overlooked or regarded as unworthy of description, is the more remarkable, in that the remains cover in all a length of 1418 feet.

Finding that the Ordnance surveyors were blind to the merits of all or most antiquities other than tumuli (a term, by the way, which they use to cover a multitude of facts), I have in this, as in all other cases, taken measurements myself, and have prepared the plan which is now before you. (See plan.)

Starting at the down stream end, we have first a fallen *mênhir*, consisting of a granite block 12 ft. 6 in. long by 5 ft. wide at the larger, and 1 ft. 5 in. at the smaller end, having a uniform thickness of 1 ft. 6 in. or thereabouts.



A. Hansford Worth D.S.P.

This *mênhir* forms the commencement of a line 488 feet in length, the stones constituting which are about 1 ft. 6 in. above ground on the average, and are in some places arranged singly, at others in pairs so as to form an incomplete parallellithon.

An examination shows that this has at no time been an avenue throughout its entire length, but that the work of doubling the row of stones was never completed. It is curious that the other two lines associated with this are single throughout their entire lengths.

This row is terminated by a small barrow of about eighteen feet diameter, which apparently covers a kistvaen. A stone, probably the cover of this kistvaen, lies a few feet away from the barrow to the south. If there was ever a kistvaen here it has fallen in, and the earth, stones, and heather have hidden it.

One hundred and nineteen feet to the south-east of this barrow is the large cairn known as Giant's Basin, probably on account of the concavity of its upper surface. This cairn is thirty-four feet in diameter at the top, and eighty-four at the base. Between it and the barrow is a group of stones, consisting of a large flat slab held in an inclined position by resting on smaller blocks.

To the north-west of the barrow, and 132 feet from it, lies another *mênhir*, 9 ft. 5 in. long by 2 ft. 9 in. wide. This forms the end of a row of stones, single throughout with the exception of the pair next the *mênhir*. This row is 491 feet long, and contains seventy-six stones; it terminates at the east in a barrow or tumulus twenty-nine feet wide at base, and surrounded by a stone circle of which nine members can still be traced. These, as are those around the other two barrows, are flat slabs inclined away from the mound, and supported in that position by smaller stones. (See figure 6a.)

About equidistant on either side of this last barrow are two others of similar size, the northern of which has no stone row attached, but is surrounded by a circle, of which thirteen members can still be traced.

The southern barrow, which is sixty-eight feet from the central, is surrounded by a circle, of which twelve stones still remain; and in addition to this a row, now incomplete, extends towards the barrow by Giant's Basin, and terminates, after continuing over 276 feet, in a fallen *mênhir* 17 ft. 10 in. long, 4 feet wide at its longer end, and 2 ft. 7 in. at its smaller, and about 1 ft. 2 in.

thick. The whole row contains, exclusive of the *mênhir*, eleven stones.

Further to the east, and in the alignment of this last row, is an enclosure containing two hut-circles, and last of all a large cairn, fifty-nine feet in diameter.

To the north of all is a *kistvaen* standing on an artificial mound, thirty-five feet in diameter at base. The cover-stone, which measures 6 feet by 4 ft. 3 in., has been raised, and now rests inclined against one of the edges of the kist, which itself measures 4 feet long by 2 ft. 3 in. wide and 3 ft. 6 in. deep. (See figure 6.) An exceedingly fragmentary row extends from this 250 feet to the eastward, where it terminates in a stone circle of twenty feet diameter.

There are several enclosures in the neighbourhood, all of which contain hut-circles.

Before leaving this point I would draw attention to a trifling inaccuracy to be found in Page's work on Dartmoor. I say trifling, because I have reason to believe that more serious errors occur in the same book.

On page 194 I find the following statement concerning the Thornworthy *kistvaen*: "The one now before us is a remarkably fine specimen—as far as I am aware, the only one upon Dartmoor with the cover-stone intact. Instead of lying broken near at hand, the massive slab has been propped on a lump of granite, and rests on one of the sides of the tomb."

Now I know eight undoubted *kistvaens* in the Plym valley alone, and in the case of each of these eight the cover-stone is absolutely intact; a state of affairs hardly in accordance with the implied statement I have just read.

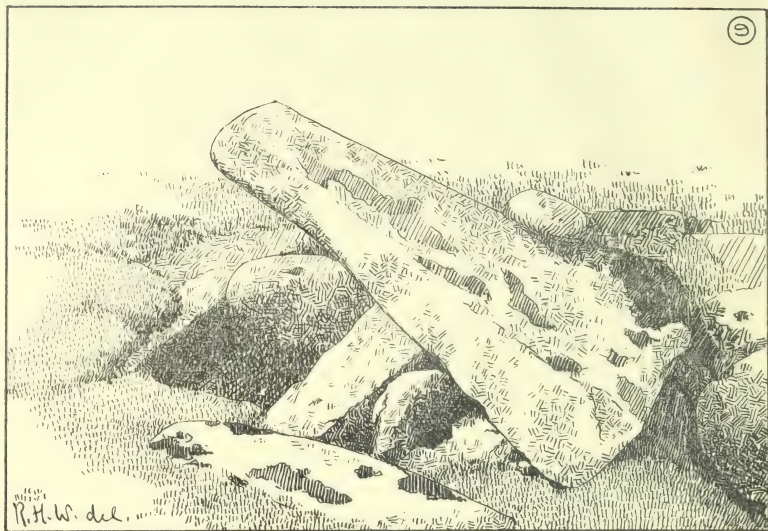
EYLESBARROW TO PLYM HEAD.

As time is getting short I must now pass somewhat hurriedly over the remainder of the valley. On the summit of Eylesbarrow hill are two tumuli, much disturbed, but which from present appearances seem at some time to have been chambered, although this may be due to recent interference.

On the slope of Lower Harter Tor, which faces Langecombe, is a large pound which encloses three hut-circles; while outside it, to the west, is a cairn which has been broken into.

The lower portion of Langecombe bears evidence to considerable

9



R.H.W. del.

CALVESLAKE.

10



R.H.W. del.

EVILCOMBE.

activity on the part of the streamers. A leat which is taken out of the brook on the west side is carried for some distance along the steep slope of the hill in made ground, and to support this a retaining wall of considerable height has been erected. A little further up, and on the eastern side of the combe, is a ruin which may once have been a blowing-house ; but I hazard this statement with caution.

Near the head of Langcombe, on the eastern hill, is the kistvaen known as Grimsgrrove, or Grave. The tomb is better built than is usual, and the cover-stone, which has now fallen in, was trimmed square to fit it. The measurements of the kist are 3ft. 3in. by 2ft. 9in., by 2ft. deep, and a circle of stones fourteen feet in diameter surrounds it. This circle contains nine stones, all of which are standing. (See figures 7 and 8.)

Near Calveslake Tor is a mound eighteen feet in diameter, supporting a kistvaen 1ft. 6in. wide, by 3ft. 7in. long, and 1ft. 7in. deep. (See figure 9.)

The cover-stone has been removed, and rests in a slanting position partly overhanging the tomb. It is irregularly shaped, and its longest diagonal is seven feet, its shorter being six feet.

In Evilcombe, opposite Calveslake, are the remains of a beehive hut, the wall of which still stands to a height of 4ft. 6in. The extreme inside diameter of the hut cannot be obtained, but is probably seven or eight feet, while at three feet from the floor the diameter is five feet. This is the only hut in the Plym valley in anything approaching a perfect condition. (See figure 10.)

From Evilcombe to the Abbot's Way the whole ground has been disturbed for tin. Nature left this stretch of country in an exceedingly rough and incomplete condition ; but subsequent efforts on the part of the miners in many ages have most certainly not improved it. As a rough bit of walking this portion of the valley cannot be excelled. Natural quagmires, artificial ponds of varying sizes and depths, rabbit burrows covered only by thin crusts of fragile soil, short galleries driven into the ground by tin-searchers, and mounds of spoil fetched forth from the galleries, all conspire to render broken limbs, if not premature decease, possible incidents for the adventurous traveller.

This district has been mined within recent years ; and in the valley above Evilcombe are the remains of a complete crushing plant for tin ore.

Of the Abbot's Way itself I need say little, except that near it I picked up a few months ago a flint flake, imperfect, but bearing every mark of the manufactured article. It is, in fact, the end of a flint knife.

The last building of which I have any knowledge in the Plym valley is a small square erection on the north bank at the end of the last gorge on the Plym. Above this point stretches the boggy table-land in which the river has its rise, and which but for that fact would be destitute of all interest, archæological or otherwise.

CONVERSAZIONE.

(2nd January, 1890.)

An account of this will be found among the Reports.

EDUCATIONAL THEORIES IN FRANCE IN THE EIGHTEENTH CENTURY.

SYLLABUS OF LECTURE BY MISS A. G. COOPER.

(Read 9th January, 1890.)

THE 18th century : its characteristics ; in France, the reign of "ideas." The chief feature of educational work in the 17th century : practical effort in the direction of educational organization. The full expression of a philosophical doctrine of education to be sought in the 18th century. Rousseau, the foremost amongst French writers, on Pedagogy. "The Emile : " its theories. Education under the French Revolution. The work of Condorcet, Lakanal, and other leaders.

INSTITUTIONS BY GROWTH AND BY CREATION.

SYLLABUS OF LECTURE BY MR. D. D. DOBELL.

(Read 16th January, 1890.)

THE two schools of thought. The problem. Only civil institutions now referred to. Persistency of bad institutions and customs. Polyandry ; descent traceable only from mothers, and little regard for family life. Patriarchal system, and great regard for family life : customary laws, status, polygamy, and domestic slavery. The caste system. The village commune system. Voting by acclamation. Emergence in Western Europe by battle and effort from the stationary life and its unconscious inactivity, despair, and wretchedness. Decay of feudalism and chivalry. Encroachments on commons and waste. Sovereign trading companies. Diplomacy. Domicile. Objection to foreigners. English jury system. Fiction of original compact. Influence of climate overrated. The metaphorical growth and the actual creation of institutions on models.

SOCIAL AND MORAL CONDITION OF ROME IN THE FIRST CENTURY.

SYLLABUS OF LECTURE BY MR. F. H. COLSON, M.A.

(Read 23rd January, 1890.)

ORDINARY view of Roman society. Its supposed wholesale depravity. Difficulties of the view. Tendency of modern historians to modify it. Evidences for a moral condition of Rome : (1) scandalous stories of the Imperial Court ; (2) moral tone of the denunciations of their times in Roman authors ; (3) great Roman writers. The first class of evidence not so valuable as usually supposed—points rather to pessimism than corruption.

Causes of Roman pessimism. Second class of evidence. Scandals true in main, though exaggerated. Mainly confined to the Claudian Cæsars. Third class of evidence most valuable. The Roman writers probably fair samples of the general public. Their tone low on some subjects, high on others. Their views on gluttony and the treatment of slaves. Peculiar importance of Pliny's letters. Contrast between Pliny's description of his female acquaintance and Juvenal's picture of women. General conclusion. The first century, though bad in one respect, not totally depraved. Rather very dissatisfied with itself. This dissatisfaction had results both bad and good. In some cases it led to reckless luxury and voluptuousness, in others to pessimism. But it also led to a seeking after something better, and greatly helped the spread of Christianity.

CHARITY AND CHARITIES.

SYLLABUS OF LECTURE BY MR. R. N. WORTH, F.G.S.

(Read 30th January, 1890.)

DEFINITIONS. Charity not the singular form of the plural charities. Mediæval charities. Modern joint-stock charities. Fashionable subscriptions. Conscience money. The professional philanthropist. Sectarian and political charities. Pauperising doles. Injury done by modern charities to children. Poverty no crime. Wealth no virtue. A modern idea of the good Samaritan. Be just before you are ostentatious. The great need of the poorer classes of this country not charities, not even charity, but justice. Our charities not a source of pride but of shame—the terrible monuments of our social shortcomings. Hints at remedies.

THE OYSTER.

LECTURE BY MR. G. C. BOURNE, M.A., F.L.S.

(Read 6th February, 1890.)

LOCALISM *VERSUS* CENTRALISM.

SYLLABUS OF LECTURE BY REV. J. ERSKINE RISK, M.A.

(Read 13th February, 1890.)

THE subject comes under head of History of Politics. (1) Regard it in light of opinion of foreign neighbours. (2) Of development of our own people. I. Emile de Laveleye's (Belgian) exposition of Centralistic views of M. Dupont. White. Statement of M. Guizot. II. Localistic arrangements in Anglo-Saxon times. (2) Intense centralisation in Anglo-Norman times. (3) Period of transition, and rise of true Parliaments (13th-15th century). Foreign estimates of probable results in the future of change of centre of gravity since the three reform bills. German Jurists' profound confidence in England's future. England's triumphs must now be won. (1) Over relations of Localism and Centralism. (2) By re-adjustment of relations between equality of civil rights and equality of economic social relations. This triumph only possible through growth of moral intelligence and mental sobriety.

FOR A VERDICT AGAINST CAPITAL PUNISHMENT.

SYLLABUS OF LECTURE BY MR. W. SQUARE, F.R.C.S., F.R.G.S.

(Read 20th February, 1890.)

ERRATIC ideas of crime. Varieties of crime. Differentiation. The tax-payer. The errors of police regime. The treatment of criminals. Their environment. Seven reasons against capital punishment.

ART-CULTURE *VERSUS* TECHNICAL EDUCATION.

SYLLABUS OF LECTURE BY MR. J. PHILLIPS.

(Read 27th February, 1890.)

THE key to the study of most public questions has become the social question. Art is not excepted, unless regarded from a purely selfish point. In art or craft men are working out the social problem. In this art-culture becomes a prominent factor. It is one of the earliest influences on life and character. No one exempt from it, from the years of first intelligence to the close of life. Thus it becomes a powerful vehicle for carrying the happiness of life.

Common definition of Technical Education. To supply the place of the old apprenticeship system. Making our young craftsmen more thorough and efficient, as carpenters, &c. A great accession would result in ranks of skilled artificers who are *not* producers. By rate-aided schools low-priced labour is taxed to train high priced-labour. It does not follow that the employer will avail himself of the extra skill of his workman. Legitimate object of technical training, development of *new* industries. Revival of old industries, and decentralization of productive skilled labour.

SOME EXTINCT CORNISH FAMILIES.

BY MR. W. C. WADE.

(Read March 6th, 1890.)

I SHOULD consider that I advanced too high a claim were I, in speaking of the men of Cornwall, to adopt the language of a writer in the *Times* of March 28th, 1882, when he stated, "Class for class they will beat all England." There are other counties which could fairly claim a hearing before we pronounced such a summary decision.

The tendency of my remarks to-night will be directed to showing how, in two ancient Cornish patrician families, the "grand old name of gentleman" has been borne with dignity from age to age, until the last of each name has closed the story of his race.

Dr. Borlase wrote: "It is a melancholy reflection to look back on so many great families as have formerly adorned the county of Cornwall, and are now no more—the Grenvilles, the Arundells, Carminows, Champernouns, Bodrugans, Mohuns, Killigrews, Bevilles, Trevanions ('that name like thunder'), which had great sway and possessions in these parts. The most lasting families have only their seasons, more or less of a certain constitutional length. They have their spring and summer sunshine glare, their wane, decline, and death; they flourish and shine perhaps for ages, at last they sicken, their light grows pale, and, at a crisis when their offsets are withered, and the old stock is blasted, the whole tribe disappear, and leave the world as they have done in Cornwall. There are limits ordained to everything under the sun. Man will not abide in honour."

In addition to the names cited by Dr. Borlase there are many other extinct Cornish families, first amongst which is that of Godolphin, and following that may be cited De Dunstanville, Tresillian, Tregothnan, Tregian, Noy (of which family was Charles the First's Attorney General), and many more. I may here remark that it seems rather hard on the memory of Sir Richard

Grenville, as a Cornishman, that the Laureate should constructively rank him with the "men of Devon" in that great epic the "Revenge."

Camden, the great Elizabethan antiquary and genealogist, in his *Britannia*, speaks very highly indeed of the Cornishmen. He says: "And yet is Cornwall nothing happier in regard of the soil than it is for the people, who as they were endued and adorned with all civility, even in those ancient times, for by reason of their acquaintance with merchants sailing there for tin, as Diodorus Siculus reporteth, they were more courteous toward strangers, so they are valiant, hardy, well pitched in stature, brawny and strong limbed for wrestling, in which they so far excel, to say nothing of that manly exercise and feat of hurling the ball which they use, that for sleight and clean strength together, they justly win the prize and praise from other nations in that behalf."

That the men of Cornwall have, in past times, been considered worthy of the front rank, is proved by the weight given to the county in the Parliaments of our ancient kings. Up to the date of the Reform Bill of 1832, Cornwall sent forty-four members to Parliament out of a total of about five hundred and twenty for all England and Wales.

Cornwall, therefore, held about one-twelfth share of the representation of England and Wales, and alone returned as many members as Scotland. This is apart from my subject to-night, excepting to show the esteem in which the Cornish people were held, as most of these seats were pocket boroughs, owned by the chief local families, who were neither possessed of great wealth nor of powerful interest at Court. It is curious that a county so remote from Court influences should have acquired, and so long retained, such an extraordinarily large representation in Parliament. Most of these seats had been in existence before the close of the reign of Elizabeth.

One is tempted to pursue the subject of the characteristics of the Cornish a little further, and to point out that although the inhabitants of the county have always, from the earliest times, been a religious people, we do not find that they exhibited the gross credulity of admiring nodding saints, and weeping images of the Virgin, or the fanaticism of burning heretics. I believe no martyr fires were lit in the most western county, and I doubt

if they ever burnt any witches there. In leaving this subject I should like just to quote the Rt. Hon. Leonard Courtney's words in London at the meeting of Cornishmen held last Saturday (March 1st), when he said of Cornwall, "Her people were full of integrity, frugal were they, and bred in the austere and antique fashion."

It is necessary for the purposes of this paper that I should refer to two only of the families previously mentioned, because to prove interesting to anyone but a "dry-as-dust" genealogist, family biography must necessarily relate memorable incidents, rather than act as a mere catalogue of names and dates. Genealogy has always been considered a dry study, because it deals so much in figures. It should be remembered, however, that behind the bare statement of names and dates lie many a life of trial, many a tale of tears, of blighted hopes, and the ever-repeated ending of each mortal record, over which the antiquary may fittingly sigh as he marshals forth the family story in the skeleton form of what is termed a pedigree.

I purpose, as briefly as possible, to give an outline of the histories of the families of Killigrew of Arwenack, Falmouth, and of Godolphin of Godolphin, near Helston.

I have laid on the table a manuscript history of the Killigrews, which appears to have been compiled in 1738, by Martin Lister Killigrew, Esquire, the last representative—and that by marriage—of this ancient family. The contents of the manuscript were published by me in 1878. Until very recently I was unaware that Mr. Worth had published, so far back as in 1871, a portion of this manuscript from a copy derived from an original not then known to exist. Some valuable notes, and a letter from the above Martin Killigrew, accompanied Mr. Worth's publication in the *Transactions of the Royal Institution of Cornwall*.

I was also unaware that Mr. H. M. Jeffery, F.R.S., had republished the full text of my publication and notes, collated with Mr. Worth's and with another copy, in the same journal for 1887. Many writers—including the Messrs. Lysons—have referred to this manuscript, and everyone concluded that no original existed. I believe that the one produced is not only contemporary, but an original manuscript. It is very probable that a duplicate also existed.

Mr. Jeffery runs away with the hasty conclusion that mine is

not original, because he is able to supply some trifling differences from copies obtained from two old books formerly at Arwenack, but which have been lost since 1871. He chiefly relies on one or two omissions in my printed copy, which were caused by hurried transcription, and by the necessity of suiting the publication to a newspaper. If he had asked to view my manuscript, he would have saved himself from much labour and some doubts. It is curious that he gives the preference to my text, and prints it *in extenso*—occupying twenty pages of the journal—while he uses the other copy only as an occasional reference. Unfortunately the last three or four pages of my manuscript are lost, and he supplies these from his copy.

It will be seen that the writing and paper of the manuscript are evidently those of the period; viz., 1738. I am convinced that this manuscript was written by Mr. Edward Snoxell, then secretary in London for Martin Lister Killigrew, Esquire, and at the latter's dictation, while the note pasted into one of the two books is, I believe, in Killigrew's own hand, being written in the scholarly style of the seventeenth century. Killigrew probably did not write any manuscript history in his own hand, as at that period he was very old, and we know, used his secretary for writing nearly everything. The writing appears to be Snoxell's, from other writing of his which I have. He was then twenty-nine years of age, and removed to Falmouth in the same year. In 1759 his daughter, Penelope, married a relation of mine who resided at Falmouth, and the manuscript has remained in the family ever since. I have on the table a deed of lease from Arwenack Manor, to the same Mr. Snoxell, relating to property at Falmouth, and dated 1761.

As this is a most important Cornish family record, and one which is constantly referred to by county historians, I trust I have not given too much time to this point.

The manuscript is addressed to John Merrill, Esquire, who married one of the female heiresses of the Killigrews, and it gives such a history of the family, and of its intimate business affairs, as should be left by the head of every family to those who are to succeed him.

I do not propose to read any of this manuscript, but only to refer to it in giving a short history of the main branch of the Killigrews. The family of Killigrew originated, or for centuries

resided, at the manor of Killigrew, in St. Erme. It has been stated by Hals, and following him some writers, that Richard, Duke of Cornwall, and king of the Romans, was actually related to this family, from the fact of that prince having relegated to them their arms of a double-headed eagle, within the border of Cornwall (bezants); but that fact proves nothing, since many other families in Cornwall bear bezants, and one other bears the double eagle; viz., the Godolphins.

Ralph Killigrew was therefore not a natural son of Richard Duke of Cornwall and Joan de Valletort. This forms number one of the scandalous chronicle of Hals, to which I shall have to refer more than once in this paper.

John de Killigrew had £20 a year or more in land in 1292. This would amount to a very considerable sum in the present currency. Henry de Killigrew held a military feu in the hundred of Stratton in 1402, while Ralph Killigrew held one in the hundred of Powder.

In the 15th century the Killigrews took up their residence at Arwenack, Falmouth, through their marriage with the heiress of the great Arwenack estate; but they did not part with the manor of Killigrew until 1636, and probably maintained a residence there until that time, as we frequently meet with references to the family as being at Truro, as though they belonged to that place. As this is not a pedigree, I pass over many names of worthy squires who held knights' fees, intermarried with gentle ladies, and for whom fines were paid *post mortem*.

The earliest monument to any member of the family is the brass in Gluvias Church, near Penryn, to Thomas Killigrew and his two wives, Joan and Elizabeth, and all their children. He is described as a gentleman (*generosus*), and is represented in the costume of the latter part of the 15th century in a long handsome robe, trimmed with fur, and carries on his right shoulder his hat after the fashion of his time. He looks like a wealthy merchant; there is nothing of a military character in his surroundings.

The next distinguished man of his race was John Killigrew, who, with John Treffry, Esq., of Fowey, was engaged in building the fortress at Pendennis in the time of Henry VIII., and he became the first governor of the Castle, the site being rented of him by the Crown. He rebuilt Arwenack House early in the reign of Elizabeth, and died in 1567. This house is stated to

have been the finest mansion in Cornwall, and to have contained a large number of rooms decorated in the highest taste of that period. A good description and plan of the house is published by Mr. Jeffery in the *Trans. Royal Inst. of Cornwall*. We know that considerable luxury was enjoyed by the Cornish gentry at this time, since we find that the silver plate seized by the Crown in 1562, belonging to Sir John Arundell, of Lanherne, amounted in weight to about one hundred pounds, and consisted of plates, spoons, candlesticks, tankards, covered cups, and bowls.

In Budock Church is a brass bearing the following inscription : "Here lyeth John Killigrew, Esq., of Arwenack, and lord of the manor of Killigrew, in Cornwall; and Elizabeth Trewinnard, his wife. [She was daughter of J. Trewinnard, Esq., of St. Erth.] He was the first captain of Pendennis Castle, made by Henry VIII., and so continued until the ninth of Queen Elizabeth, at which time God took him to his mercy." The brass shows him as a grim warrior clad in *cap-a-pie* armour. He was succeeded by his son John, who was knighted by the Virgin Queen in 1574, and who married Mary, daughter of Philip Wolverston, Esq., of Wolverston Hall, Suffolk, and widow of Henry Knyvet. Of this knight little is recorded anywhere. There can be no doubt as to the story about his wife, Dame Mary, to which I shall have to refer presently. He sent two of his sons to the Court of Elizabeth, Thomas and Simon by name, and these founded those younger branches of this family in the neighbourhood of London, which are now also extinct. Queen Elizabeth is said to have remarked, in connection with the Killigrews and some other Cornish gentlemen, that they were all born courtiers, and with a becoming confidence.

The story about Dame Mary, wife of Sir John, is as follows (given in the *Calendar of State Papers, Domestic*): A Spanish ship, called the *Mary*, of St. Sebastian, came into Falmouth Harbour in January, 1582, and was boarded by a boatful of men, acting under Dame Killigrew's orders, and who overpowered the Spaniards, and set sail for Ireland. The Spaniards were thrown overboard. Two men, named Kendal and Hawkins, brought ashore sundry bolts of Hollands and leather, which they gave to Lady Killigrew. It happened that the two merchants to whom the cargo belonged remained ashore that night, and when they found that their ship and cargo had been stolen they went to

London, and raised such a storm through their ambassador that a judicial inquiry was instituted by the Earl of Bedford. The result was, that Lady Mary had to go to London at considerable expense, and had to use all her influence to prevent herself being punished for her share in these piratical proceedings, and it need scarcely be added that the humbler performers received the punishment of death at Launceston. The family manuscript makes no reference whatever to this affair. This must not be regarded as an ordinary act of piracy; for such proceedings were constant between the English and Spaniards at this period, being only six years before the Armada came. The only difference between this act and Drake's is, that this ship was then in an English port on a trading enterprise. The State Papers give an account some years later (1595) of the attempt of the captain of a Portuguese privateer to blow up Arwenack House. He landed at night with a quantity of combustibles, intending to fire the house, and to set fire to the shipping in Falmouth harbour. He avowed that the chief cause of his coming was to carry off Mr. Killigrew's wife and children.

The first Sir John Killigrew died in 1584, and in Budock Church is a brass to his memory, and that of Dame Mary, his wife. In addition to the two sons referred to, who went to Elizabeth's Court, he had two daughters, Mary and Katherine, and was succeeded by his eldest son John in the Cornish estates and governorship of Pendennis Castle.

This son, John Killigrew, married Dorothy, daughter of Thomas Monk, Esq., of Poderidge, Devon, and by her had a family of nine sons and five daughters. Eleven of this family survived to adult age. His wife was a great aunt of General Monk, Duke of Albemarle. He is described in the family manuscript as a gamester, and negligent in his affairs, a fine gentleman, and so profuse in his style of living that, although he inherited £6000 a year, he left only a shattered estate to his eldest son, the second Sir John. He was governor of Pendennis at the time of the threatened Spanish invasion, and in 1591 he urgently petitioned the Queen's Council to further strengthen the castle, and offered to perform a portion of the work with his own tenantry. He died in 1594, and was succeeded by his son John (the fourth in succession of that Christian name), who was knighted by James I. at Whitehall in November, 1617. He was, according to the family manuscript, a "sober and good man," who had the misfortune to marry a lady

(Jane, daughter of Sir George Fermor) with whom very serious domestic troubles subsequently arose. He prosecuted a divorce against her in the Archbishop's court, which lasted so many years, and was so very expensive, that it quite ruined his estate to the extent of his being put to very great shifts to get home from London after the frequent recesses of the process. But he at last obtained the divorce, the manuscript says, "in all its formal extent;" but he had to allow his wife £20 per annum, and at his death, in 1632, she came into the whole of the remains of the Arwenack estate as her jointure, which makes it appear that she was never actually divorced. The town of Penryn sustained her by monetary aid during the litigation, and she presented a silver cup to the borough, with this inscription: "From Maior to Maior to the town of Permarin, when they received me that was in great misery, Jane Killigrew, 1633." She afterwards married Captain Francis Bluett, and lived in possession of the Killigrew estate till her death, (1648), she having then survived her first husband sixteen years. About this Lady Jane Killigrew, Hals has originated a detailed story, and Hitchens and Drew have followed him unquestioningly. It represents her as having been engaged in a more notorious act of piracy than that recorded of Lady Mary, in which two casks of doubloons were stolen from a Dutch ship, which she herself boarded; and it was stated that she gave the cup to the town of Penryn for help out of this difficulty, and that the date on the cup was 1613. It was this lady's husband's grandmother who was concerned in the piratical affair before mentioned. This story shows the thorough inaccuracy of Hals as a county biographer; in fact, Lysons says of him that the publication of his work was suspended for want of purchasers, occasioned by the scurrilous anecdotes which it contained. Mr. H. M. Whitley points out that Hals was a scandalmonger, and evidently had a grudge against this and almost every other Cornish family.

Another act of injustice has been done in a recent work, but I am sure quite unwittingly, to the memory of a brave soldier and estimable man. Captain Oliver, in his admirable little *History of Pendennis*, in our library, surmises that it was with Sir Nicholas Parker, governor of Pendennis, that the name of Lady Jane had been compromisingly coupled. Sir Nicholas Parker died in 1603. A very high character of him stands recorded on his brass in

Budock Church, and he was a most intimate friend of Sir John's. Not a particle of evidence remains against him. It would not be worth enquiring into this ancient scandal except to clear the innocent; but I may add that the State papers show that Sir John wrote in 1626 to Secretary Conway, appealing to him to remove Captain Bonython from the command of Pendennis Castle on account of his misconduct, principally of a private nature, against Sir John. Even this is not proof positive as against Bonython.

To resume the narrative. The last Sir John, to whom I have been referring, distinguished himself as a most active man, and but for the litigation and domestic troubles referred to would probably have earned a very high position amongst Cornishmen. He obtained a license from James I. for building four houses at Falmouth—then called Smithick—and in spite of the opposition of the town of Penryn, the jealousy of which was fully aroused, because it had always enjoyed the profit of supplying vessels seeking the shelter of Falmouth haven, as well as of all mercantile pursuits. At that period it was not permitted to build even a few houses without royal license; and Sir John had to make several journeys to London about it at great expense (as the family MS. informs us), and the record goes on to say that when the troubles of Charles I. came, the buildings were increased beyond the license; "but this was not minded when the prerogative of the Crown was disregarded," and soon the big town of Falmouth sprang up. There can be no doubt of the natural advantages of Falmouth over Penryn; but it is equally certain that but for the fostering care of the Killigrews this town would not have been built and incorporated more than 200 years ago.

Then this Sir John, in January, 1619, obtained another patent from King James for erecting a lighthouse on the Lizard Point, and kept the light burning from 1619 to 1624 at great pecuniary loss. His brother, Sir William Killigrew, vainly tried to get this patent renewed in 1633. This is one of the earliest cases of a lighthouse being locally established; and I think it goes against the currently received opinion that the Cornish were fond of procuring shipwrecks on their coast. I believe there is an entire absence of proof of any ship having ever been lured to destruction on the coast of Cornwall.

I do not say that the Cornish have not been as prone to stealing

the proceeds of wrecks as any other maritime people. In fact, there is ample proof of their readiness to seize the spoil cast up by the sea, as well as their avidity for smuggling, which latter procedure in those days was considered as a kind of protest in favour of free trading, and was clandestinely tolerated by some in authority up to the time of the establishment of the regular Coastguard.

On the death of Sir John, his younger brother Peter, afterwards Sir Peter, became the representative of the family; and on the death of the divorced Lady Jane he entered into possession of the Arwenack estate, which was then sadly reduced in value, as by a Parliamentary inquiry at about this time it is valued at only £80 a year; whereas on the first Sir John's coming into possession it is said to have been valued at £6000 a year.

Sir Peter is described as having been bred under the Earl of Bristol in Spain, and at home at Court, and that he was a fine gentleman—a gamester in his youth when he had nothing to lose—and ever a merry and desirable companion, even in those times of civil distractions; and while preserving his loyalty to his king, he obtained the esteem of those of the opposite faction.

Whilst he was still a younger brother this Sir Peter, who had nothing but his wit and agreeable temper to live on (as the family chronicler reports), had fallen in love with one of the sisters of Lord Lucas, of Colchester; but his suit had been refused, because of his being unable to offer her a jointure. This fact being reported to his friends—William, Earl of Pembroke, and Philip Herbert his brother—they out of their generous natures gave to Sir Peter and Dame Mary his wife, various parcels of land at or near Cardiff, amounting in value to £300 a year.

About this time Sir Peter, who was called “Peter the Post,” brought a message to the king from Madrid in what was considered in those days an extraordinarily short time. He rode overland through Spain and France, and crossing to Dover by a fleet ship, rode quickly to London, performing the journey in a week.

When the Civil War came he took the side of the king, but without taking up arms, as several of his kinsmen did. One of these, Sir Henry Killigrew, was in Pendennis Castle during the long siege (that being the last fortress in England that was yielded to the Parliament). It was during this siege that most of Arwenack House was destroyed by fire; viz., on March 16th,

1646. The family MS. attributes the burning to the animosity of the governor of the castle. There is no proof of this; but, on the contrary, a letter written at the time, and quoted in Captain Oliver's *History of Pendennis*, proves that the burning of the house was a necessary act of self-defence on the part of the governor. It states that Colonel Arundell sallied out and burnt Arwenack House, and would also have burnt the town of Pennycomequick, as the writer styles it, but for the enemy coming sooner than was expected, so that he had only time to burn the manor-house. Mr. Jeffery gives confirmatory proof of this.

When King Charles was imprisoned at Hampton Court, Sir Peter, being apprised of the bad intentions of Cromwell, had a private interview with the king, and showed him the imminent danger he was in, and said that he had provided relays of horses and a ship on the coast of Sussex, and with his head would answer for carrying him off safely, provided the king would keep the secret, especially from his two favourites, whom Sir Peter named to the king. (Mr. Worth suggests, and probably correctly, that these were Ashburnham and Berkeley.) Charles agreed to the proposal, and said he would go to bed as usual, and when all was quiet would rise again, and be ready to take horse at the time and place appointed in the night. At two o'clock Sir Peter was punctual on his part, and waited until daylight, when he got off, but not without suspicion and questioning. The two favourites took off the king on the following night, as described by Clarendon, and went to the coast as if to seek for a ship. Mr. Worth seems to think that the king and his two maladroit advisers might have misunderstood the time and place. At any rate, this attempted escape hastened Charles's end. The MS. says that Sir Peter used to relate this anecdote with tears in his eyes—no doubt because of his confidence in the success of his own arrangements, which had been neglected.

Sir Peter became bail to the Parliament for his brother-in-law, Lord Lucas, in £6000; and through that nobleman's escape would have had to forfeit the whole amount—sufficient to have ruined almost any man in those times; but his interest with the Parliamentary side was so great that he was able to escape any payment in the end. Lord Lucas afterwards again took up arms, and was tried by court-martial after the capture of Colchester, when he was shot.

When Sir Peter came into possession of Arwenack in 1648 he was able to bring to it about £12,000 of his personal estate. He got the Custom-house removed from Penryn to Smethick; and finally, when the king "enjoyed his own again," and Sir Peter was rewarded with a baronetcy, he used his interest to get a charter for the town, which in 1660 was duly incorporated as the Borough of Falmouth, with a representation in Parliament. He chiefly contributed to building the church, which is called after Charles "the Martyr," and he represented the new borough in Parliament.

Sir Peter died in 1667 on the road to Exeter, leaving his son, the second Sir Peter, £7000 in money besides the estates. The latter had married, in 1662, Frances, daughter of Sir Roger Twysden, of East Peckham, in Kent, "one of the finest women of her time, mistress of good sense, and endowed with virtue and beauty." One of the most scathing letters of reproach ever written was addressed by this lady to Mr. Quarne, the incumbent of Falmouth, accusing him of ingratitude to his patron, Sir Peter, after the latter's decease. This letter is preserved among the archives at Arwenack manor-office.

This second Sir Peter, and the last of the Killigrews to whom I shall have to refer, had by Lady Frances, one son, George, and two daughters, Anne and Frances. He had been living a good deal at Court, but afterwards went back to Falmouth in 1670. In 1687 his son, who had been married to Ann, daughter of Sir John St. Aubyn (in 1684, she being then only seventeen), was killed in a duel at Penryn by Walter Vincent, a barrister. The MS. says that he was basely murdered by a stab in the back in a tavern at Penryn. This is incorrect, because Vincent was tried for the offence at Launceston and acquitted, but died not long after, according to Hals, of atrophy, caused by the sad event preying upon his mind. The widow of George Killigrew subsequently married a Mr. Goslyn, of Westminster, master of the signet office.

The loss of his only son is stated to have broken Sir Peter's heart, inasmuch as he never took a delight in anything again, but in his lady and two daughters. Frances, his elder daughter, having been married to Richard Erisey, Esq., of Erisey—a family also now extinct—had to return home with her young daughter Mary, owing to domestic differences with her husband. It was

then that Martin Lister, the writer of the MS. so often referred to, and who had been an intimate friend of George Killigrew's, was married to Sir Peter's second daughter Ann. Lister, who subsequently took the name of Killigrew, was of a good Staffordshire family settled at Liston, and he describes himself in the third person as having been a young gentleman and a soldier of fortune. This marriage proved a very happy one, and a comfort to all the members of the family. He had the mortification to survive his wife and her sister, besides their parents.

Soon after this last marriage Sir Peter and all the members of the family removed to London, being chiefly induced to do this because of the constant troubles he had with the Corporation of Falmouth, and the endless litigation which resulted. By means of the Corporation he had a lawsuit with Sir Nicholas Slanning about a field worth £100, and which Sir Peter won in the end; but it cost him £1000, and Slanning £3000. He built the town quay at Falmouth; and in order to bring in fresh water—there being no good water in the town—went to the expense of £700 in making a conduit with a mill-house. In doing this he had managed to divert the course for thirty yards on the land of Sir Vyel Vyvyan, who at the wish of the Corporation of Falmouth demanded a heavy rental and fine from Sir Peter, when he, resenting such conduct in a neighbouring landowner, abandoned the whole thing.

The MS. quotes a decision of Chief Justice Holt in the matter of signing the bye-laws of the town of Falmouth, in which he remarked “that the king's power did not extend to the granting by charter to the infringing any man's right, much less could any corporation under pretence of bye-laws do it; and as to his and the rest of the judges signing such laws, gives them no real weight to the infringement of any man's right.”

One of the town's bye-laws enacted that all new-comers into the town should pay a fine to the mayor for license to open shop windows. This they put in practice for some years, until Martin Killigrew having heard of it, and that it had been enforced in the case of a shoemaker who was very poor, he offered to obtain the repayment of the money by law; but the poor man, after consulting his friends, begged Killigrew not to move in the matter, as he was assured that he and his family would not be suffered to live in the town if they offended the Corporation.

I have heard from an old gentleman who lived in Plymouth when a boy, and was a member of one of its principal families, that before the reformed corporation it was well known that if any tradesman came into collision with the ruling powers he might as well remove at once, as they would make it too warm for him to live in the town. It is one of the pleasures attending the investigation of the affairs of olden times to be able to discern where and to what extent we have in our day improved in liberty of opinion and action. I am inclined to ascribe most of this advance to the influence of our free Press.

Sir Peter had one other litigation, which cost him £3000, and which was also brought about by the action of the Corporation.

In 1688 Sir Peter took violent measures for obtaining money from the Crown for repairing Pendennis Castle, which was leased by him to the Government.

Amongst the Treasury papers is the copy of a paper from Mr. Kent, collector of the port of Penryn (dated 1688), concerning £201 taken from him by Sir Peter Killigrew, who came with an armed force to his house after ten at night, saying the king was his tenant, and Pendennis Castle wanted repairing, and with the money he would repair it; and the document also refers to the collector's arrest and confinement in the castle. This was a hard measure even for that period, but the family manuscript does not refer to it at all. It would seem from this fact that Sir Peter was rather overbearing, and I have the lease of a property at Falmouth granted and signed by Sir Peter's great granddaughter, the Hon. Frances Berkeley, to the Mr. Snoxell before referred to in 1761, by which it would appear that the customs of the manor were particularly irksome; for the tenant had not only to act as reeve, but to grind his corn at the manor mill, and to pay to the manor market toll on all grain purchased by him, and to provide a capon at Christmas, and to pay an extra rental of £5 per annum should he ever become mayor, alderman, or burgess of Falmouth, or even if he ever let the property to any such. The clauses as to loss of possession in case of disrepair appear to be exceedingly stringent. If such things were demanded as late as 1761, one can understand the last Sir Peter having sufficient causes for dispute with the Corporation of Falmouth, or *vice versa*.

Sir Peter, the last male of his race in the main line, died

in 1704 at Ludlow—Mr. Jeffery erroneously gives the date as 1705—and was buried in Falmouth Church, where lie many of his kindred. It is said that, in his latter years, he passed his time in scientific pursuits of a speculative character, and whatever they were, the results of his studies have died with him. He represented Falmouth in Parliament, but never engaged himself deeply in State affairs. The family historian says of him, that from his pacific life, and being a steady member of the Church of England, he was frowned upon in the time of King William, when he tried to exact his rights as to the rental of Pendennis by the Crown, although, through his being a Deputy-Lieutenant and J.P., no man in his county was more exposedly useful on the coming in of King William than himself.

I may remark that no memorial tablets are now visible in Falmouth Church relating to the Killigrews, those that were placed there having been covered over by subsequent “restoration,” as the process is facetiously called.

The only traces of the Killigrews now at Falmouth are the manor-house of Arwenack, rebuilt by the second Sir Peter in 1662, and much altered again one hundred years ago, and also a very fine avenue of trees to the westward of the house, which from their age were evidently planted about the same time. There is also an obelisk memorial to Sir Peter opposite the manor-house, and which was erected by Martin Lister Killigrew, who long survived the other members of the family, dying in 1743 or in 1745, the date being variously stated. His wife, Anne Killigrew, died in 1727.

Here my account of the Falmouth Killigrews ends, and I propose referring as briefly as possible to that other great West Cornish family—the Godolphins of Godolphin, allied to the Killigrews by twice intermarrying with daughters of that house.

Camden, referring to Godolphin Hill as being famous for its tin, says this place is far more remarkable for the lords thereof bearing the same name, who with their virtues have equalled the ancientness of that house and lineage.

Although their pedigree does not extend so far as the Conquest, it begins far back in the Plantagenet times.

Hals exclaims of them, “Certes, from the time this family was seized of Godolphin, such a race of famous, flourishing, learned,

valiant, prudent men, have served their prince and country as members of Parliament, justices of the peace, deputy-lieutenants, sheriffs, colonels, &c., as scarce any other family this country hath afforded ;” and he states that an ancestress of his belonged to this great family. Nevertheless, his love for a malicious thrust could not spare his own kindred ; for he tells us that of old this family was called Knava, and that whilst one John Knava was sheriff of Cornwall, Henry VII. took exception to the suggestiveness of the name, and altered it to Godolphin, of which place he was lord. This statement is entirely without foundation, as Godolphins of Godolphin can be traced for many descents before the wars of the Roses ; and Hals, who simply collected gossip, cites no muniments or documents to support any of his mere hearsay statements.

The first John, lord Godolphin, flourished about the reign of Henry III. or Edward I. ; but Colonel Vivian, in his genealogical table, is unable to assign a precise date. He married Margaret, daughter of Roger Trewargon. Mr. Tregelles says the remains of the mansion (now occupied as a spacious farm-house), the many roads of approach to it, the antique gardens, and the broad-terraced hedges, still testify to its importance ; and there was a time when the only newspaper which reached this remote part of England was brought by the Lord Treasurer Godolphin’s special messenger, to Exeter, and laid on the table of the hall at Godolphin, for the benefit of the neighbouring clergy and gentry.

Dr. Borlase gives a conjectural view of the house in its glory, surrounded by its park and groves.

The house is now occupied by Mr. Roseveare Rosewarne, C.C., and has been restored by him. A portion of the ancient mansion remains, erected in the reign of Henry VIII. or earlier, including the fine hall with a carved oak roof, and a beautifully carved oak screen which covers the whole space round and about the fireplace. A large portion of the present building is due to the great Lord Treasurer. In the hall is set up a leaden cast of the arms of Henry VIII. In the older part of the house, now uninhabited, is a room called the royal room, with a large open granite fireplace, and a remarkably fine carved entrance. Opening out from this room is that in which it is said Charles II. once slept, and which has been described to me by my father, who slept in it during a visit at the house about fifty years ago. This room has five exits

or means of escape. There were three doors, and also exits through the ceiling and the floor. There was at one time a chapel attached to the house, as in the case of most other ancient mansions.

It still possesses a fine portico of white granite along the north front, and there is a hedge of box twenty feet high, besides a hedge broad enough to drive a waggon on. I have referred to this house at some length, because it is important to remember the kind of surroundings of the West Cornish gentry in Tudor and Stuart times, if we wish to form a just idea of their manner of living, or to compare them with the same class in other parts of the kingdom during the same period.

It is no part of my duty in this paper to detail the births, marriages, and deaths of a succession of worthy sheriffs, knights, and squires of this family who succeeded the first John, Lord Godolphin; and I pass over several who filled these and other similar offices until we come to Sir William Godolphin, who was knighted by "Bluff King Hal," and distinguished himself by his bravery at the siege of Boulogne. He represented Cornwall as a knight of the shire in the Parliaments of Henry VIII. and Edward VI., and dying in 1570 was buried in Breage Church. It is on record that Sir William was one of a commission or jury appointed in the fourth year of Queen Elizabeth "to inquire what wife or wives in the county of Cornwall did wear, since the 15th of August last, any gown of silk, French hood, or bonnet of velvet, with any habiliment paste or edge of gold about her or their necks, or in their ruffles, or in or upon any parcel of their body." The object of this was to see that all who were so attired should also own a trotting gelding, in order to provide cavalry horses in time of war. The jury found that the wives of Sir William Godolphin, John Trelawny, John Arundell of Lanherne, Hugh Trevanion, Piers Edgcumbe, Arundell of Trevice, and John Bevyll, had all been so attired, and could all provide horses. The two first-named were well able to act on the jury, since they had to make oath as to their own wives' finery. The nephew and heir of Sir William was Sir Francis Godolphin, knighted by Elizabeth, who helped Carew to write his *Survey of Cornwall*, and who also did probably more than any other Cornishman to introduce improvements in mining, especially in stamping and washing the ore. It is stated that he was assisted by a skilled German, who in this instance was not a Dr. Douster-

swivel, as in the case of Jonathan Oldbuck, Esq., of "Antiquary" fame.

Carew states that Queen Elizabeth derived a revenue of £1000 a year from Godolphin's tin works. Sir Francis represented Cornwall in Parliament, although it is said that he very much preferred country life at home to attendance at Court. When the Armada was preparing to threaten our shores he was appointed colonel of a regiment armed with 470 pikes, 490 muskets, and 240 calivers. Some years after the Armada period the Spaniards attacked and burned Newlyn, Mousehole, and Penzance; but Sir Francis showed such a bold front in resisting them that they quickly took to their ships again. He was twice married, his second wife being Margaret Killigrew; while an ancestor in the reign of Henry VII. had married Elizabeth, daughter of John Killigrew. He was buried at Breage in 1608. His son, Sir William, died five years later, after greatly distinguishing himself in Ireland during the partial invasion of that island by the Spaniards, under Don Juan d'Aquila, in the year 1600. He served in the Parliaments of Elizabeth and James I., and married Dorothy, daughter of Thomas Sidney, Esq., of Wrighton, Norfolk, and by her had one daughter, Penelope, and three sons, Francis, Sidney, and William. This son William commanded a regiment for King Charles, and distinguished himself in the West of England engagements. Sidney, the second son, lost his life at Chagford while serving on the king's side, in a skirmish which took place there. Clarendon says "he was a young gentleman of incomparable parts; his advice was of great authority with all the commanders, being always one of the council of war. He, engaging himself in the action at Chagford, received a mortal shot by a musket, of which he died in an instant, leaving the misfortune of his death on a place which could never otherwise have had a mention in the world." This seems rather hard on the little town. He was buried in the chancel of Okehampton Church.

Thomas Hobbes said of this Sidney Godolphin, in his *Leviathan*: "I have known clearness of judgment and largeness of fancy, strength of reason and graceful elocution, a courage for the war, and fear for the law, and all eminently in one man, and that was my most honoured friend, Mr. Sidney Godolphin, who, hating no man nor hated of any, was unfortunately slain in the beginning of the Civil War."

Francis, the eldest of the before-named three sons, succeeded to the estates, and was an M.P. in the Parliaments of Charles I.; and perceiving the Civil War's approach, he retired to his Cornish seat, secured the Scilly Islands for the king's cause, and raised the regiment of foot which his brother William commanded. He was rewarded at the Restoration by being created a Knight of the Bath, an old title then revived.

It is singular to find that the Cornish gentry were nearly all on the side of the king, though so far removed from Court influence, or from personal interest at Court. With the exception of Sir John Elliot, who died before the war arose, the only great Cornishmen on the side of the Parliament were, I believe, Sir Nicholas Carew and Sir Richard Buller. But on the other side we find Arundels, Bassets, Killigrews, and Edgcumbes; and the old couplet from a poem is recalled, which recites—

“The four wheels of King Charles's wain,
Grenville, Godolphin, Trevannion, Slanning slain.”

Slanning belonged to Devonshire, and his armour is still to be seen suspended in Bickleigh Church. King Charles very gratefully expressed his thanks to the loyal Cornish, and his long letter of thanks is still to be seen in many churches in the county. It is generally relegated to the tower, but is of great interest.

I have now to pass to the last great man in the main line of the Godolphin family, and therefore the only other one to whom this paper can refer. This was Sidney Godolphin, the statesman. He was the third son of that Sir Francis who was created a K.B. by Charles II. He was born about 1635 (the date is quite uncertain); and it is stated that when Charles II., then Prince of Wales, was driven into Cornwall by the exigencies of the war he made the acquaintance of young Godolphin, and formed a high opinion of him, and after the Restoration gave him a place at Court. In 1663 he was returned as M.P. for Helston to the long or pensionary Parliament, and continued to represent that borough in subsequent Parliaments while he remained a Commoner.

He was twice sent on a special mission to the States of Holland by Charles II. Towards the end of the reign of that king he was made a Commissioner of the Treasury and Privy Councillor; and it was said that that he was one of the three who were looked upon as the ministry, and esteemed to be alone in the management of the king's affairs.

In 1684 he was named a principal Secretary of State, first Commissioner of the Treasury, and created Baron Godolphin, of Rialton.

On the accession of James II. he was entrusted with similar positions, although he had opposed the succession of James on politico-religious grounds. When the king resolved to go in person to the West, to meet the Prince of Orange, Lord Godolphin was in the number of those to whom he committed the administration of affairs in his absence, and he afterwards deputed Godolphin to go to the Prince of Orange to arrange terms. On the vacancy of the throne Godolphin was in favour of a regency. Nevertheless, when William and Mary were proclaimed king and queen, they at once restored him to the Treasury and Privy Council.

As early as 1668 Mr. Pepys writes that he was informed by Lord Sandwich that he considered Godolphin as the worthiest man, and one that may be trusted in anything relating to him in the world. Again he says, "Made a visit to Mr. Godolphin in his chamber, and I do find him a very pretty and able person, a man of very fine parts, and of infinite zeal to my Lord Sandwich, and one that says he is (he believes) as wise and able a person as any prince in the world."

It is stated that Lord Godolphin was very solemn, stately, and silent in his demeanour. "In his breast were locked the State secrets and intricate policies of a succession of English monarchs." He is stated to have loved cards because of their preventing the necessity of his conversing. Perhaps cards are often used with the same object in the present day.

Before referring to the close of his career it may be best to refer to his wife, Margaret Blague, who is described as "having been a saint at Court," when acting as maid of honour to the Duchess of York. Her life has been written by John Evelyn, who was inspired with the most fervent admiration for her high mental gifts, and still more for her surpassingly gentle and kindly disposition.

She first joined the Duchess of York as maid of honour when only fifteen years of age; but she had no liking for Court frivolities, and very reluctantly acted a part in a Court play. Evelyn describes her as being as graceful and charming in person as she was admirable in character; and it is not too much to say that she evidently impressed that learned scientist more than any

other woman of his time. She fled gladly from the Court, after having served also as maid of honour to Charles II.'s queen. After living for some time in retirement she married that "singular and silent lover" Sydney Godolphin at Temple Church in May, 1675. She died about three years afterwards of a fever, shortly after the birth of her only son, in her twenty-fifth year.

Evelyn never passed the anniversary of her death without emotion, sorrow, and tears. Her husband never married again, and survived her by thirty-four years. It is said that he had a passionate admiration for Mary of Modena, James II.'s queen, and used to "send her many presents that ladies like." Before her death his wife wrote him a letter, settling her affairs with the tenderest solicitude, and begging pardon for all her imperfections, and concluding by saying that she would beg that her body might lie, where she had had such a mind to go herself, at Godolphin among her husband's friends. She added that she believed the expense would not be great if carried by sea. However, at the cost of £1000 she was taken by land, the funeral passing all down through the country with great state, and she was buried in Breage Church, close by the sounding Cornish sea.

During the reign of William, Godolphin was openly accused in Parliament of keeping up, together with his intimate friend the Duke of Marlborough, a treasonable correspondence with the exiled king at St. Germain. This attack entirely failed. It has been said that this correspondence had taken place with the full sanction of William, who is reported to have expressed his admiration of the results of Godolphin's coquetting with the exiled James and his French Court. The politics of that period are so much involved in plots and counter plots that no one can now clearly state the exact intentions of the actors.

On the accession of Queen Anne he was made Lord Treasurer of England; and under his administration public credit, which before was in a sinking condition, revived, and the war was carried on with success by his friend Marlborough (who was a Devonshire man), while to Godolphin was attributed a share of the triumph. He was constituted a Knight of the Garter in 1704, and in 1706 he was selected to accompany Queen Anne to the thanksgiving service at St. Paul's after the battle of Ramillies. At the end of the same year he was elevated to the dignity of Earl Godolphin.

To summarise some of his later actions, I may mention that by

his means Nova Scotia was added to the dominions of Great Britain. He advised the establishment of the Queen Anne's Bounty Fund, and induced the Queen to contribute £100,000 to the war fund when extra taxes were imposed upon the people. He worked with the utmost energy to obtain the union of England and Scotland, and at last was gratified by seeing that accomplished, when he was made Lord Treasurer of the United Kingdom.

From this time the star of Godolphin paled. He had long been assailed in Parliament by partisan malcontents, and even when his former friend Harley joined his enemies, he for a time bore down all his assailants, ever remaining silent under attack, while he wrote his friend Marlborough, that no galley slave could suffer more torment than he had to undergo. It is unnecessary to discuss the politics of the period, but eventually Mrs. Masham, and Harley, Earl of Oxford, supplanted the Duke and Duchess of Marlborough, as the dear friends of the Queen, and Godolphin lost all influence with Anne, who sent him a very summary letter of dismissal, which evoked a very bitter reply from him, probably the bitterest ever written by a subject to a sovereign.

The fall of Godolphin, which Marlborough did all he possibly could to prevent, had a terrible effect on the financial credit of England. Bank shares at once fell from 140 to 110, and soon to 106, whilst the bank refused a loan of £400,000 to the new Government. I may here remark that Bishop Burnet records, with respect to Godolphin's assailants, that their attack about the Scotch Treasury was an effusion of Tory malice, and adds that the Earl of Godolphin's unblemished integrity was such that no imputation of any sort could be fastened upon him.

Earl Godolphin, after a long illness, died at the Duke of Marlborough's house at St. Alban's, 15th September, 1712. His age was about eighty, but there is no exact account of the date of his birth. Mr. Tregelles says that four dukes—namely, Richmond, Schomberg, Devonshire, and Marlborough—were the pall-bearers when the remains of one of our most illustrious Cornishmen were interred at night in Westminster Abbey.

There is no important record of Francis the second and last Earl Godolphin. He filled many court appointments, and married Marlborough's daughter, who became Duchess of Marlborough. They had one son, and two daughters; the son, who was Marquis

of Blandford, died during his father's lifetime, and not many years after the death of the latter the name of Godolphin in the male line became extinct. The daughters married the Dukes of Newcastle and Leeds.

In parting with the subject of the great Earl, it is desirable to add a few personal traits of his character.

He was fond of horseracing and other forms of sport; and while he gambled at cards successfully, it is certain that he, like many another great genius, died poor, although his elder brother had left him £5000 a year, chiefly in the Cornish estates. He used to keep open house at Newmarket, and was very charitable and generous. The Duchess of Marlborough wrote, that when all his debts were paid, there could hardly be enough to bury him. He kept no state, had no ostentation, pride, or insolence of behaviour.

Notwithstanding his own poverty, so far as regarded the public weal, hardly ever was there a statesman of more reliable, cool judgment, or a more skilled political economist; nor did anyone possess in a higher degree the then rare virtue of incorruptible integrity in administering the finances of the country. Although Godolphin had been the trusted minister of four sovereigns, it is clear that he was no Court sycophant, from his having run counter to the wishes of Charles II. and James II. by voting for the exclusion bill, and to William and Mary by favouring a Regency when the accession of William seemed inevitable. Men seemed to have felt that in Godolphin's hands they were safe.

I must acknowledge my indebtedness to Mr. Tregelles's *Cornish Worthies* for many particulars of Godolphin's career, and who says he believes there is no other monograph account of him. I have also referred to Collins's *Peerage* of 1756, and I have already acknowledged some valuable notes of Mr. Worth's in my account of the Killigrews, in relation to which I am also indebted to Mr. H. M. Whitley's contributions to the *Transactions of the Royal Institution of Cornwall*.

I am also obliged to Mr. Wright, our borough librarian, for bringing to my notice Messrs. Boase and Courtney's *Collectanea Cornubiensis*, which is now completed in all save the index. This work shows the most extraordinary research and industry, since it refers to an immense number of Cornishmen, chiefly of the middle class; while for the main lines of the great families,

pedigree references are mostly given, and I am glad to see mention made of a large number of living Cornishmen (or gentlemen who have written about that county), and amongst them the names of some members of this Institution. This work is a monumental one, and together with the authors' *Bibliotheca* will render Cornish biography an easy matter to future students. My paper to-night has aimed at showing, however faintly, the kind of men who occupied leading positions in our sister county two or three centuries ago, whose names are almost forgotten, and yet whose memories deserve to live. We have found them, although living under sterner conditions than those which exist for us in our own constitutional days (lit up by universal education and a free Press, and with unrestricted communications between our own and distant countries), yet not very different in their carriage and aims to the Englishmen of to-day. They were more picturesque in costume, if less finished in manners. If their times were fuller of romantic and perilous incidents, they were spared the keen and often intense competition of these later days. These men, who took so large a part in shaping the history of their times, and in framing the laws which guide us now, were of such courage in their actions, and such wisdom in counsel, that with all their faults any country would be glad and proud to preserve their memories.

APPENDIX A.

Mr. Jeffery says, "The following estimate of the family of Killigrew, which was written by Hals, page 126, doubtless represents the deliberate sense of their contemporaries :

" 'The stock is ancient, and divers of the Branches have grown to great advancement in Calling and Livelihood by their greater Deserts, though I could never understand that any of them ever served their Prince or country in any public capacity as Parliament men, Justices of the Peace, or Sheriffs of this County ; out of a politic and secret Reserve to themselves, as not thinking it prudent to do other Men's Business at their own proper Cost and Charges, or to be puffed up or pleased with the tickling Conceit of making themselves popular in their Country with any office they did not get money by. Wherefore generally they were Courtiers and Favourites of their Princes, and got many boons thereby of great value.' "



Godolphin.



Killygrew.

The above statements are untrustworthy in almost every particular. There were nine Killigrews who represented various Cornish seats in twenty-six different Parliaments, according to Mr. W. P. Courtney's *Parliamentary History of Cornwall*, besides the fact that they were D.L.'s and J.P.'s in many reigns.

APPENDIX B.

Mr. A. J. Jewers, F.S.A., has pointed out to me that in Fowey Church, on a Treffry tomb, the arms of Killigrew are given as gules three mascles argent; but it is singular that this is the coat of Arwenack, while the marriage that the coat refers to took place prior to the Killigrews marrying the Arwenacks. Again, the branch of the Killigrews which settled in Devonshire gave the Arwenack coat as their arms instead of their own ancient coat. Heraldry seems to have been very irregularly attended to by this family.

ARMS OF THE KILLIGREWS AND GODOLPHINS.

The family MS. of the Killigrews states that Richard, Duke of Cornwall, and King of the Romans (elected A.D. 1257), gave the Killigrews their arms, consisting of the Imperial Roman eagle, sable, on a field argent, surrounded by the border of Cornwall, sable bezantée.

We find the same Imperial eagle in the arms of Godolphin—coloured argent in a field, gules, and between three fleurs-de-lis of the first.

Both these arms were doubtless bestowed as very special marks of distinction by their feudal chieftain, Duke Richard, although the occasion is now forgotten. The bezantée border is borne by many Cornish families.

COLONIAL FEDERATION.

(March 13th, 1890.)

THIS discussion was initiated by Mr. Frank Phillips, who furnished a variety of statistics relating to the Australian colonies. He was favourable to a scheme of Federation as greatly to the benefit of our colonial empire, but considered that very grave difficulties had to be overcome in dealing with divergent interests. He hoped, however, to see a grand Federation of the Australian colonies.

THE PRACTICAL ASPECT OF MARINE ZOOLOGY.

SYLLABUS OF LECTURE BY MR. J. T. CUNNINGHAM, B.A., F.R.S.E.

(Read 20th March, 1890.)

THE several departments of marine zoology and their comparative practical importance. Taxonomy and bionomics the two departments which have the most direct relation to the fisheries. Some illustrations of the practical aspect of taxonomy: (1) English anchovies and Norwegian anchovies; (2) The destruction of immature fish; (3) Fishery statistics. Taxonomy the foundation of bionomics. Practical measures for improving or maintaining the supply of fish all depend on knowledge of bionomics. Fishes are wild animals, and may be exterminated by unrestricted fishing. Theories of artificial propagation of fishes. Fishery statistics. History of marine pisciculture on a scale of commercial importance. The question of marine pisciculture in the United Kingdom.

WATER.

SYLLABUS OF FOURTH PAPER ON THIS SUBJECT BY MR. A. R. DEBNAM.

(Read 27th March, 1890.)

ANCIENT supplies. Source of supply. Purification. Storage. Distribution. Value of water as a motive power. Value to Plymouth of a large storage reservoir.

CHARLES SPENCE BATE,

L.D.S., R.C.S. ENG., F.R.S.

So full a notice of the life and work of the late Charles Spence Bate has appeared in the *Transactions of the Devonshire Association*¹ that little more is necessary than to record the fact of his removal from among us.

He became a Member of the Society in 1852, and for upwards of thirty years took an active part in every thing that concerned its welfare. Not excepting the original founders, no Member, probably, ever did the Institution such good service. He aroused it from the state of lethargy into which it had fallen for several years previously to his associating himself with it, and excited a fresh and intelligent interest in its work and objects. By his efforts the publication of the Annual Proceedings were commenced, and their continuance rendered possible; and to a great extent it is owing to him that we have our present Museum, for his persistent endeavours to influence public opinion, and to impress upon his generation the great value of local collections, rendered the work more easy for those by whom the erection of the new building was at length successfully carried out.

He delivered upwards of thirty lectures and addresses in the Athenæum, many of them of much permanent interest, and the Library and Museum contain many valuable presentations from him.

The decision not to maintain the new Museum as a purely local one was a very keen disappointment to Spence Bate, and it caused him to withdraw from all participation in the affairs of the Society, and although he continued his Membership, we believe he never entered the Athenæum again—certainly not to attend a lecture or to take any part in its proceedings.

Charles Spence Bate was born at Truro, 12th March, 1812, and died at South Brent, 29th July, 1889.

¹ Vide *Transactions of the Devonshire Association*, vol. xxi., 1889.

STONE ADZE FROM AVONWICK.

MR. ELLERY A. BENNETT, of Plymouth, in September, 1889, found an adze of stone in a field on Woodland Farm, Ugborough, near Avonwick. It was lying on the grass, and had evidently been exposed some little time, as while one side was partly coated with soil-crust, the other was clean and somewhat bleached, as if by the action of rain and sun. The colour is a dull ochrey-grey. In the absence of a fresh fracture there was some little difficulty in arriving at a conclusion as to the material; but it appears to have been wrought out of a felstone or elvan which has suffered some surface decomposition, and originally seems to have been of a bluish-grey. There is a quasi-granular character however which somewhat suggests an indurated tuff. It can now be cut with a knife. It is a blunted ovoid in shape, exceedingly well formed and symmetrical, and seems to have been originally brought to as fine a finish as the texture of the rock permitted. Extreme length, $3\frac{7}{8}$ in.; extreme breadth (half an inch from outer point of cutting edge), $2\frac{5}{16}$ in.; breadth within half-inch of butt (where the rounding off begins), $1\frac{1}{2}$ in.; greatest thickness, $1\frac{1}{2}$ in. The hole has been pierced from both sides—the openings meeting at a ridge in the middle, which forms the narrowest part of the aperture—and is fairly rounded. The opening on one side is approximately an inch in diameter every way, that on the other is slightly oval—an inch in the longest diameter by $\frac{7}{8}$ in the shortest. The internal or smallest portion of the hole is just $\frac{9}{16}$ in diameter. The breadth of the outer margin of the aperture reduces the central thickness of the adze as seen in section to the extent of an eighth of an inch on one side and a little over a sixteenth on the other.

Save that it is better formed, this implement closely resembles a greenstone adze found at North Bovey in 1865, described by Mr. G. W. Ormerod, F.G.S., and figured in Evans's *Stone Implements*. Length, $3\frac{3}{4}$ in.; breadth, $2\frac{1}{2}$ in.; thickness, $1\frac{1}{2}$ in.; diameter of hole, $\frac{1}{2}$ inch.

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